Voyager III

432-0005-00-10
Revision 110
February 2012

Operator's Manual

© FLIR Systems, Inc., 2012. All rights reserved worldwide. No parts of this manual, in whole or in part, may be copied, photocopied, translated, or transmitted to any electronic medium or machine readable form without the prior written permission of FLIR Systems, Inc.

Names and marks appearing on the products herein are either registered trademarks or trademarks of FLIR Systems, Inc. and/or its subsidiaries. All other trademarks, trade names, or company names referenced herein are used for identification only and are the property of their respective owners.

This product is protected by patents, design patents, patents pending, or design patents pending.

The Voyager III thermal imaging system is controlled by US export laws. There are special versions of this system that are approved for international distribution and travel. Please contact FLIR Systems if you have any questions.

FLIR Systems, Inc.
70 Castilian Drive
Goleta, CA 93117
Phone: +1.888.747.FLIR (+1.888.747.3547)

www.flir.com/maritime

Document Number: 432-0005-00-10, Revision 110

Document History

Revision	Date	Comment
100	September 2011	Initial Release
110	February 2012	Minor Revision

This document is controlled to FLIR Technology Level 1. The information contained in this document pertains to a dual use product controlled for export by the Export Administration Regulations (EAR). FLIR trade secrets contained herein are subject to disclosure restrictions as a matter of law. Diversion contrary to US law is prohibited. US Department of Commerce authorization is not required prior to export or transfer to foreign persons or parties unless otherwise prohibited.

CE **Warning**: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Contents

CHAPTER 1 Voyager III Overview 5

Additional References 5
Documentation Conventions 6
Warnings and Cautions. 6
System Description. 7
General Operation 7
Specialized Modes of Operation 7
System Components. 9
The Voyager III Camera Body 9
Voyager III Bulkhead Box 10
Cables 10
Joystick Control Unit (JCU) 11
Multiple JCUs and Other Devices 11
Video Display. 12
Thermal Imaging 12
Video Screen Icons 13

CHAPTER 2 Voyager III Joystick Control Unit 15

JCU Introduction. 15
JCU Buttons. 15
Power/DIM Button 16
MENU Button 16
USER Button 16
SCENE Button 17
COLOR Button 17
HOME Button 18
Special Button Functions 18
Button Summary 19
JCU Puck. 19
Tilting the Camera 20
Panning the Camera 20
Zooming the Camera 20
Focusing the Camera 21
JCU Display. 22

CHAPTER 3 Voyager III System Startup 23

System Startup and Shutdown. 23

The Bootup Process. 23
Standby Mode. 25
JCU Power Menu. 26
Factory Default Settings. 28

CHAPTER 4 Voyager III Firefighter Mode and Tracking 31

Overview. 31
Using Firefighter Mode. 31
Using Voyager III Tracking. 33
Setup for Tracking 36
How Tracking Affects Other System Features 36
Tracking Concepts 37
Tracking Algorithms 38
Joystick Operation for Tracking 39

CHAPTER 5 Voyager III System Configuration 43

Overview. 43
Main Menu. 44
Firefighter Menu. 45
NMEA Menu. 45
NMEA Mode 47
RSD Message 47
BWC Message 48
TTM Message 48
Target Dwell 49
Mounting Height 49
Mounting X and Y Offset 49
Mounting Angle 49
Video Setup Menu. 49
Set Thermal Color Default 50
Video Polarity 50
Color Thermal Video 50
Test Pattern 51
Set Symbology Menu. 52
PC Icon and JCU Icon 52
Icon Display Mode 52
Elevation Icon 53
User Programmable Button Menu. 53
Long Press 53
Short Press 54
System Setup Menu. 54
Align Thermal Images 55
Foveal View 55
Gyro Stabilization 55
Joystick Mode 56
Twist-to-Pan Mode 56

Webcam 57
Surveillance Menu 57
Analog Video Menu 58
Tracker/PIP Menu 59
About Help Menu 59
Point and Park 60
Point 60
Park 61

CHAPTER 6 Voyager III Webcam Interface 63

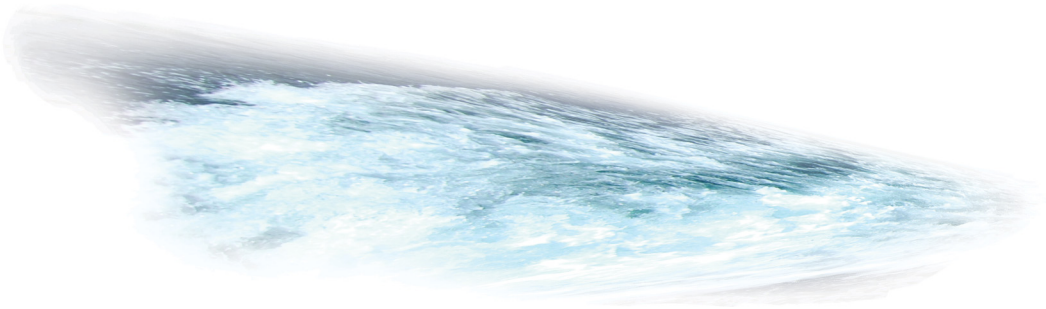
Voyager III Webcam Introduction. 63
Basic Webcam Configuration. 64
Browser Requirements 64
Configuration Steps 64
Using the Webcam Interface. 66
Controlling Camera Position 67
Image Mode Control 68
Contrast Mode 68
IR Video Controls 68
DLTV Controls 68
Web Browser Configuration. 69
Browser Security Settings 69
Installing the VLC Player 69
Advanced Configuration Topics. 71
Changing Voyager III Camera Static IP Address 72
Changing the IP Address of the JCU 74
Enabling Universal Plug and Play (UPnP) 75
Using the Webcam Feature Remotely 77
Configuring the Camera to Output to a Remote Device 78
Custom Network Applications. 80
Programmers/Integrators 80
Resources Available 81
Training 81

CHAPTER 7 Voyager III Reference 83

Introduction. 83
Acronyms. 83
List of Icons. 85
System Specifications. 87
Parts and Accessories 87
System Overview 89
Troubleshooting Tips. 90

CHAPTER 1

Voyager III Overview



This manual describes the operation of the Voyager III camera. If you need help or have additional questions, please call to speak with our support experts; see the phone numbers on the back cover of this manual.

This manual includes information about the following topics:

- System description
- Using the joystick control unit (JCU)
- System startup and shutdown
- Using firefighter mode and tracking
- Configuring your Voyager III system
- Using your Voyager III as a webcam, remotely and locally
- Helpful reference information such as acronyms, parts lists, a table of icons, and troubleshooting tips

Additional References

The Voyager III camera comes with a complete documentation set on a CD (FLIR Doc. # 432-0005-00-16) that includes this manual as well as others. All documents are in PDF format and can be viewed with Adobe Acrobat Reader.

- *Voyager III Installation Guide* (FLIR Doc. # 432-0005-00-12) includes information about electrical connections and physical installation.
- *Voyager III Quick Start Guide* (FLIR Doc. # 432-0005-00-11) is a set of double-sided cards that show the functions executed by the various JCU buttons, puck movements, and on-screen symbols.

- *Voyager III Interface Control Document (ICD)* is an extensive set of CAD drawings with detailed component dimensions, wiring schemes, and mounting dimensions.There are three separate ICD documents:
  - FLIR Doc. # 500-0385-09 contains dimensions of the maritime multi-product JCU and a template to use while installing it.
  - FLIR Doc. # 432-0005-XX-19 contains drawings related to the Voyager III camera body and the interconnections among system components.
  - FLIR Doc. # 500-0483-19 contains the drawings for the bulkhead box, including over all dimensions, component locations, and wiring.

You may also refer to the Resources Web page for up-to-date documentation:

http://www.flir.com/cvs/americas/en/maritime/resources/

Documentation Conventions

For safety, and to achieve the highest levels of performance from the Voyager III system, always follow the warnings and cautions in this manual when handling and operating the Voyager III camera system.

Warning: Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury or death exist with this equipment, or may be associated with its use.

Caution: Caution notices are used where equipment might be damaged if care is not taken or an operation might have an unexpected outcome.

Note: Notes call attention to information that is especially significant to understanding and operating the equipment.

Warnings and Cautions

Warning: Do not use the Voyager III imaging system as the primary navigation system. Use it in conjunction with other navigation aids and a primary manual navigation system.

Warning: Use of insufficient wire gauge can result in fire.

Caution: Do not open the Voyager III camera unit for any reason. Disassembly of the camera (including removal of the cover) can cause permanent damage and will void the warranty.

Caution: Be careful not to leave fingerprints on the Voyager III camera optics.

Caution: The Voyager III requires a power supply of 24V DC nominal, 5 Amp maximum. Absolute voltage range: 21 – 32V DC. Operating the camera outside

of the specified input voltage range or the specified operating temperature range can cause permanent damage.

This equipment must be disposed of as electronic waste. Contact your nearest FLIR representative for instructions on how to return the product to FLIR for proper disposal.

System Description

Voyager III is a stabilized maritime thermal and visible-light camera system for use on most types of vessels. Its state-of-the-art thermal imaging system provides excellent night visibility and situational awareness, without any form of natural or artificial illumination.

Thermal Image at Night

General Operation

Voyager III's two thermal imagers are capable of producing both wide-angle and zoomed-in images. The wide field of view imager is ideal for navigation and overall situational awareness, and its long-range thermal camera can detect hazards and other vessels out to the horizon. Both cameras provide clear imagery regardless of lighting conditions.

In addition to two thermal imagers, Voyager III is also equipped with a color daylight/low-light camera capable of covering an extended field of view—from narrow to wide. Included with your Voyager III system is a sensitive video tracking device that automatically tracks a target such as another vessel after you identify it.

The Voyager III includes a camera body to install on the deck house or mast location of your choice, a bulkhead box for installation below deck, and one or more joystick control units (JCU) for installation at the primary pilot station and any other location where you want to be able to operate the camera. Each of these components is designed for years of rugged, trouble-free use.

The Voyager III system supports multiple control stations onboard. The video can be displayed on virtually any multi-function display or video monitor. The video can also be displayed on a computer screen when the webcam interface is configured.

Specialized Modes of Operation

The Voyager III system is equipped with a broad range of features that can be used to support a variety of specialized needs. You can use these features alone or in combination.

For example, you can enable surveillance mode so that the camera regularly scans a defined area. You can also use the system as a webcam from a remote

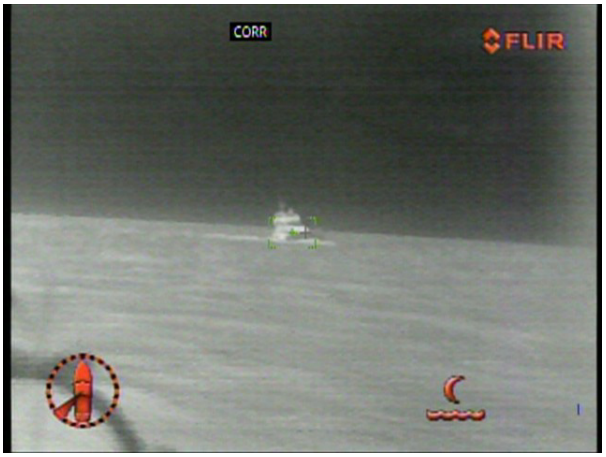
Internet connection, letting you view what is happening near your vessel even when you are miles away.

The Voyager III easily integrates with other navigation equipment such as radar or GPS and communicates through the standard National Marine Electronics Association (NMEA) 0183 protocol.

Two features are especially useful in rescue operations.

Firefighter Mode. In this mode, the Voyager III system indicates the estimated temperature of a target point and highlights areas that fall within a target temperature range. In a fire situation, this feature can help rescue personnel identify the type of fire they are dealing with, since different types of fires burn at different temperatures. For example, the estimated temperature could help firefighters distinguish between a fire fueled by oil and a structure fire fueled by wood and help assess the risk to personnel so they can use the correct methods and tools in fighting the fire. See “Using Firefighter Mode” on page 31 for details.

Tracking. When tracking is enabled, you manually identify an area on the screen that you want to track and then engage the tracker. The tracker keeps the camera pointed toward that target area. You can fine-tune the target area and make other manual adjustments. This feature can be useful when rescue personnel are attempting to contact a vessel in distress or a person overboard. See “Using Voyager III Tracking” on page 33 for details.



You can use firefighter mode and tracking mode together to provide comprehensive support for rescue operations. In the man-over-board scenario, you can use color coding associated with a temperature range to identify where the person is located and then engage the tracker to keep the camera focused on the person until the completion of a successful rescue operation.

System Components

The Voyager III system includes the following components, each of which is described briefly in this section:

- Camera body
- Bulkhead box
- Connector cables
- Joystick control unit (JCU) and weather cover

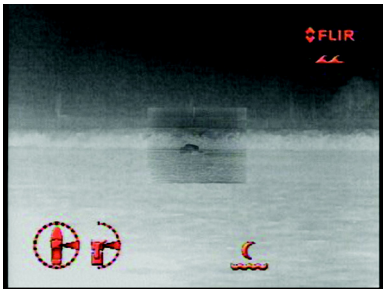
This manual describes how the Voyager III system operates. It assumes that your system is installed and ready to use. For details about installing the system, see the *Voyager III Installation Guide*.

The Voyager III Camera Body

The camera body's pan/tilt mechanism allows the operator to look 360° in azimuth, and +/– 90° in elevation. The camera body houses all three imaging sensors: wide-angle infrared, long-range infrared, and zoom color daylight/low-light camera.

Each of the infrared cameras uses an uncooled vanadium oxide (VOx) detector sensitive to long-wave infrared (LWIR) energy. The wide-angle camera uses a 35 mm lens, and the long-range camera uses a 140 mm lens.

In its default setting, Voyager III zooms digitally from the wide field of view (FOV) camera to the narrow FOV camera. At the point when the wide FOV reaches 2X zoom, the system switches over to the narrow FOV camera and zooms digitally to its maximum magnification.



Wide Field of View

Narrow Field of View

The Voyager III camera body is sealed at the factory against humidity, suspended particulates, and other contaminants. The camera body should not be opened for any reason, as it will compromise the seal and possibly damage the unit. Opening the camera body will void the manufacturer's warranty.

Voyager III Bulkhead Box

The bulkhead box is the central hub for all other Voyager III system components. It accepts vessel power in (24 VDC), and provides power to the JCU and camera body. The bulkhead box also passes command signals from the JCU to the camera body, and supplies up to six analog signals for viewing around the ship.

Two independent video paths connect from the camera body to the bulkhead box. These video signals are received by the bulkhead box and each is routed through a video amplifier/distributor that creates four outputs. One of the video channels is labeled primary and the other secondary.

Note: The physical configuration of the box supports a maximum of six cables at one time. These can be any combination of primary and secondary output.

The bulkhead box includes a slot for a communication option known as the NMEA interface board, which you can use to communicate with devices such as radar and GPS (see page 45 for details on the NMEA interface). It also contains the video tracking module used to support the Voyager III automatic tracking capabilities.

Cables

The camera cable connects the Voyager III camera body to the bulkhead box. The cable length varies, depending on what is ordered. The cable provides power to the camera from the bulkhead box and relays control commands between the camera body and the JCU. The cable also provides the standard RS-170 video signals from the camera to the bulkhead box.

This cable connects to the back of the camera body base with a circular connector. To avoid damaging the cable, it is important not to bend it too tightly. Detailed instructions for connecting the cable to the bulkhead box are included in the *Voyager III Installation Guide*.

Joystick Control Unit (JCU)

Joystick Control Unit

The JCU is the primary control device for the Voyager III system. The JCU is used to power up the camera or put it in a standby state, to operate the pan (rotation) and tilt movement of the camera, to control the Voyager III tracking features, and to configure the camera settings by means of on-screen menus. The JCU connects to the bulkhead box using an Ethernet network connection, and that same connection provides power to the JCU.

The JCU has various buttons, an LCD display, and a joystick “puck” that is used to control the pan/tilt movement and to navigate through the on-screen menus. The puck can be rotated in either direction, moved left and right or forward and back, and pushed in (like a button) and pulled up. Chapter 2, "Voyager III Joystick Control Unit," on page 15 describes the features of the JCU in detail.

The Voyager III uses on-screen symbols to indicate the camera position (azimuth) and tilt (elevation). Other symbols indicate various system settings that have been enabled or camera settings such as whether wide or narrow field of vision is being used. These symbols are explained throughout this manual in the discussion of the related activities. You can also review a full list of on-screen icons in Table 7.1 on page 85.

Multiple JCUs and Other Devices

In some installations, the system includes additional components, such as additional JCUs, video equipment, or network equipment. When the system installation includes more than one JCU, the camera can respond to commands from any of them. You can also use more than one device to display the video and when you are using tracking, you can use a picture-within-picture mode that lets you see two camera views on one screen.

Note: While it is possible for a single JCU to control more than one camera, this configuration of a Voyager III system is unlikely and not discussed in this manual. If you have a need to configure a system with more than one camera, contact FLIR support for details.

Typically, the JCU and the video monitor are mounted in close physical proximity so you can immediately see the changes on the video screen when you use the JCU to change the camera position (pan or tilt).

The Voyager III bulkhead box provides a single PoE Ethernet output. If a single JCU is used with the system, it is connected to this location with the supplied double-shielded Ethernet cable and the JCU draws its power directly through the bulkhead box. If you need to connect an additional JCU or a computer to the system, you will need to provide an Ethernet switch or equivalent. If the network

switch does not have Power over Ethernet (PoE) capability, a PoE injector can be used to provide power to the JCU. FLIR PoE injectors are available from your FLIR authorized dealer or integrator. See the *Voyager III Installation Guide* for connection diagrams.

You can also connect a computer to the system either directly or remotely through the Internet. When the webcam feature is enabled, you can control the camera from the computer, as well as view video output on the computer. See Chapter 6, "Voyager III Webcam Interface," on page 63 for details.

Contact FLIR for more information regarding available accessories including JCUs, PoE equipment, video distribution amplifiers, cables, connectors, mounting hardware, and so on. Contact information is listed on the back of this manual.

Video Display

The two thermal imagers that are part of the Voyager III system do not produce images from visible light like an ordinary camera does or like the human eye does. Rather, they use thermal infrared energy to produce images by sensing subtle differences in temperature and generating images based on those differences.

Thermal Imaging

The thermal imaging camera relies on the fact that all objects, even very cold objects like ice, emit thermal energy in the portion of the infrared spectrum that this camera can see, the long wave infrared (LWIR). Therefore, unlike an illuminated infrared camera, the thermal imaging camera does not need an additional active illumination source and images are based on directly radiated energy rather than reflected energy.

When the thermal camera is in white-hot mode, the warm objects in the scene display as white, or lighter shades of grey, and cold objects display as black or darker shades of gray. When you switch the video polarity, this is reversed.

This is why you will see hot objects such as parts on an outboard motor that appear white (or black, or red depending on the video image mode selected), while the puddles of water and other cold objects appear dark (or cool). Scenes with familiar objects will be easy to interpret with some experience. The camera automatically optimizes the image to provide you with the best contrast in most conditions.

FLIR Systems, Inc. offers a comprehensive selection of training courses to help you to get the best performance and value from your thermal imaging camera. You can find out more at the FLIR training Web page:

http://www.flir.com/training

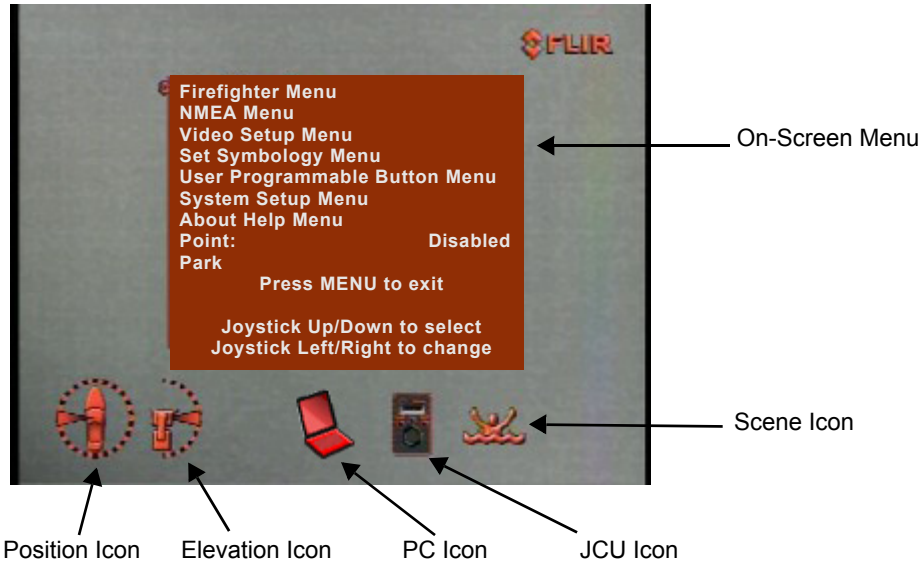
Video Screen Icons

Depending on the camera settings and the JCU buttons that have been pressed, various symbols display on the screen. Some of these icons always display on the screen, and some appear momentarily or only when certain functions are enabled or executed. In addition, many icons only display when the thermal cameras are used, not when the daylight camera is active.

The display of icons can be modified by using several configuration settings. See “Set Symbology Menu” on page 52 for a description of menu options relation to symbol display.

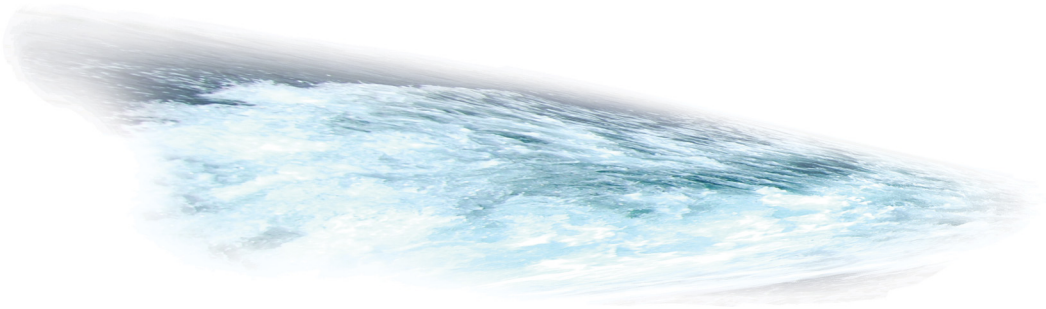
The following image of a screen illustrates some of the possible icons displayed by the system, as well as an example of the on-screen menu that displays when you press the MENU button. Using the menus is described in Chapter 5, "Voyager III System Configuration," on page 43.

A complete list of all of the icons used in the system and a brief description of how they are used can be found in Table 7.1 on page 85.



CHAPTER 2

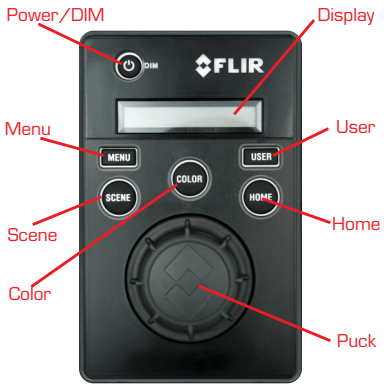
Voyager III Joystick Control Unit



JCU Introduction

The JCU is the primary method of controlling the Voyager III camera. You use it to move the camera (pan or tilt), electronically zoom the camera in and out, switch between infrared and visible-light cameras, adjust the image quality, enable or disable the video tracker, and access the on-screen menus.

This chapter describes how to use the JCU buttons to operate the camera features. Some of these features vary depending on the specific way your system has been configured. The various configuration settings and how they affect operation are discussed in Chapter 5, "Voyager III System Configuration," on page 43. When specific settings affect a particular button, you can refer to that chapter for additional details.



JCU Buttons

All of the buttons on the JCU perform multiple functions. In most cases, each performs one function when it is pressed briefly (short press) and a different function when it is pressed and held (long press). This flexibility enables a simple device to support a set of complex, rich features.

In the following discussion, the short-press action is described first, followed by the long press. In addition, enabling some system features such as firefighter mode and tracking can change how the buttons work. Table 2.1 on page 19 summarizes the two actions for each button and the effects of other modes on how the buttons operate.

Power/DIM Button

Short Press. A short press of the Power/DIM button cycles through the four levels of brightness for the JCU display. The JCU controls are backlit to make them easier to see at night. Use this button to adjust the brightness of the JCU backlighting for your comfort.

Long Press. Pressing and holding the Power/DIM button is used to “wake up” the camera, causing it to go from standby mode to powered on. It is also used to put the camera back in standby mode as well as complete other system functions such as calibrating the JCU and associating the JCU with a camera. These functions are described in more detail on page 23.

MENU Button

In many cases, you will not need to modify the factory default configuration settings of your Voyager III system. However, the system gives you many options that you may want to tailor to your own needs. These settings are available through on-screen menus. Use the MENU button to turn these menus on or off.

When the on-screen menu is displayed, use the joystick puck to navigate through the menus and select various menu entries. Each menu item is discussed in detail in Chapter 5, "Voyager III System Configuration," on page 43, which explains how to navigate using the menus in more detail.

The MENU button supports additional features when tracking is enabled. In this mode, holding down the MENU button and using the joystick lets you manage tracking features. See “Joystick Operation for Tracking” on page 39 for details.

USER Button

The USER button is a programmable one-touch button that lets you quickly access the most common or favorite settings or functions. Both the short press and the long press action of this button can be configured from the User Programmable Button Menu (see page 53).

Short Press. A short press of the USER button is initially configured to invert the Video Polarity setting from white-hot to black-hot, but you can set it to perform a number of other functions.

Long Press. Pressing and holding the USER button initially displays the on-screen menu for programming the button. The menu can also be accessed by pressing the MENU button and then scrolling down to the User Programmable Button Menu entry. You can change the long press action to initiate tracking.

Note: When you are tracking, the short-press function associated with the USER button is ignored. Instead, a short press of the USER button alternates the primary display between the on-screen display (OSD) and direct analog. See “How Tracking Affects Other System Features” on page 36 for details.

SCENE Button

Night Running

Night Docking

Day Running

Man Overboard

Short Press

A short press of the SCENE button cycles through four preset automatic gain control (AGC) settings, which change the image gain and level settings:

- Night Running
- Night Docking
- Day Running
- Man Overboard

The preset AGC settings for each scene have been optimized to offer the most balance and high quality image for specific conditions. Which setting to use depends on personal preference and environmental conditions. You may like the way the Night Docking setting looks, even though you are running on open water during the daytime. Experiment with the different settings, and find out for yourself which settings works best in different conditions.

Long Press

Pressing and holding the SCENE button switches between the thermal and visible-light cameras for any video channel set to OSD (on-screen display). The type of video to display is set using the options on the Analog Video Menu. Two separate video channels are supported: primary and secondary (see “Analog Video Menu” on page 58 for details).

If both the primary and the secondary video channels are set to OSD, then pressing and holding the SCENE button changes the video on both channels. By default, the secondary video is set to display unprocessed analog. If this is the way your system is configured, then pressing and holding the SCENE button changes only the primary channel.

COLOR Button

Short Press

Pressing the COLOR button switches the thermal camera video display. The way the button works depends on the setting of Color Thermal Video on the Video Setup Menu (see page 50).

- When Color Thermal Video is disabled, pressing the COLOR button lets you choose between white/black or red/black display options.
- When Color Thermal Video is enabled, pressing the COLOR button cycles through four preset color pallets.

The default color scheme is red/black since the equipment is often used at night in the darkness and the red-hot image can help preserve the user’s night vision. Based on personal preferences, one of the other color settings (or color palettes) can be chosen as a default.

Note: The USER button is configured to invert the video polarity setting by default, so it changes the infrared imagery from white-hot (red-hot) to black-hot.

Long Press

Press and hold the COLOR button to calibrate the thermal cameras, also called flat field correction. This process can improve the quality of the digital image by removing distortions and calibrating a more uniform output, letting you see real images more clearly.

HOME Button

Short Press. A short press of the HOME button moves the camera to its home position. The Home position is a programmable preset position—usually straight ahead and level with the horizon—that operators can use as a reference. Home is the position the camera will most likely be in when it is in use.

Long Press. Pressing and holding the HOME button sets the home position. First use the puck to point the camera's line of sight to the position you want to set as home. Press and hold the HOME button for 3 seconds; the Home symbol will flash on the screen when the new Home position is set. When you want to move the camera to this position, press and release the HOME button. When you press the HOME button, the Home icon appears on the screen briefly.

Special Button Functions

You can use combinations of buttons to perform a few additional less common functions.

JCU Reset

Occasionally it may be necessary to reset the JCU. Simultaneously pressing and holding the MENU and USER buttons causes the JCU to reset. Unplugging and plugging the Ethernet cable will also cause the JCU to lose power temporarily and reset. When it resets, it will reacquire the network IP address and display various messages on the display.

Global Standby

When the system is put into global standby, all cameras and JCUs found on the network are powered down at the same time. This function is used to properly shut down all cameras (return to park position) and JCUs prior to removing power with the system breaker.

While this option can be selected from the JCU Power Menu, you can also achieve global standby by pressing and holding the SCENE, COLOR, and HOME buttons in unison.

Note: This button sequence is essentially a hard shutdown. The JCU does not go into a countdown mode or display the Power Menu. The system immediately goes into global standby mode.

Display JCU IP Address

If you press the COLOR button while pushing the puck in, the IP address on the JCU displays on the JCU screen.

Button Summary

Table 2.1 summarizes the action of each button on the JCU and indicates how the button is affected when tracking or firefighter mode are being used.

TABLE 2.1 Summary of Button Actions

Button	Action	Tracking	Firefighter Mode
COLOR Short	Cycle through thermal color options		Disabled
COLOR Long	Calibrate thermal cameras		
DIM Short	Change JCU illumination level		
DIM Long	Display Power Menu		
HOME Short	Return to Home position		
HOME Long	Set Home value		
MENU Short	Display or exit menus	Disabled	
MENU Long	No Effect	With joystick, control tracking algorithms and acquisition region size and tracking gate offset	
SCENE Short	Cycle through preset scenes		
SCENE Long	Alternate visible and thermal cameras		
USER Short	Invert Video Polarity (can be reprogrammed)	Alternate primary display between OSD and analog	Invert Video Polarity disabled
USER Long	Display User Programmable Button Menu (can be reprogrammed)	Initiate tracking or return to normal or firefighter mode	

JCU Puck

The JCU puck functions like a joystick. It can be moved left or right or fore and aft and it can be rotated in either direction. It can also be pushed in (like a mouse click) or pulled out. It is used to move the pan/tilt position of the camera, change the focus, and zoom in and out.

In addition to controlling the camera, you use the puck to navigate through the on-screen menus and select the options you want. Push the puck forward and back to move up and down in the menus and push the puck in (click) or push it right/left to select a menu item.

If you are using the Voyager III tracking feature, you use the puck to control the tracking acquisition window and other aspects of tracking. See “Joystick Operation for Tracking” on page 39 for details.

You can configure how you interact with the puck using two settings that control how the system interprets puck movement. See “Joystick Mode” on page 56 and “Twist-to-Pan Mode” on page 56. Many operators will prefer the way the system initially works, but you should be aware that the behavior of the puck can be modified through the system settings, letting you choose the mode that feels most natural to you.

Note: The puck implements proportional control; therefore, the farther you rotate it or direct it from center; the faster the camera will move.

Tilting the Camera

You can use the puck to tilt the camera up and down by moving the puck forward and backward. By default, moving the puck forward (toward the bow) causes the camera to tilt down. Moving the puck back (toward aft) causes the camera to tilt up. This is similar to the way an airplane operates.

You can change this so that the puck functions like the joystick used in playing video games. In this case, the opposite happens: moving the joystick forward causes the camera to tilt up. Moving the puck back causes the camera to tilt down.

Panning the Camera

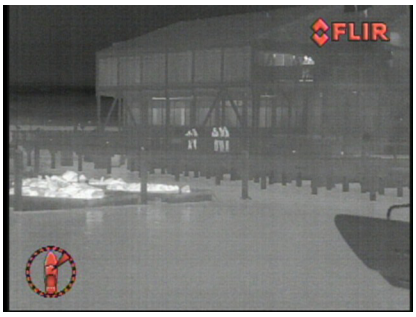
You also use the puck to pan the camera to the left and right. By default, turn the puck clockwise and the Voyager III will pivot to the right. Rotate (twist) the puck counterclockwise and the Voyager III will pivot left.

You can change this so that panning is done by pushing the puck sideways left (pan left) or right (pan right).

Zooming the Camera

By default, push the puck in and hold it to zoom the camera in and zoom out by pulling the puck out and holding. You can change this so that you zoom in by twisting the puck clockwise (zoom in) or counterclockwise (zoom out).

Thermal and visible-light imagers zoom together, so that if you change from one imager to the other, the same FOV is displayed.



Normal View

After Zooming In

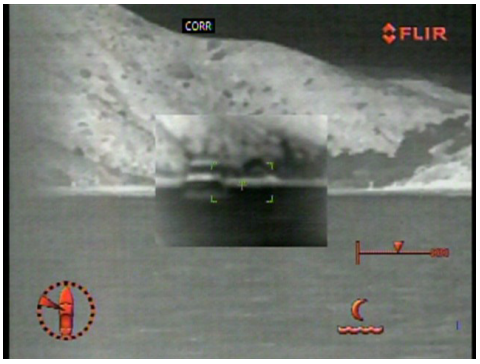
Focusing the Camera

The visible-light camera uses a continuous autofocus that cannot be adjusted manually. The wide FOV thermal imager has a fixed focus; you also cannot adjust it. If you try to adjust the wide imager's focus, the Focus icon will flash.

You can, however, manually focus the narrow FOV thermal imager. By default, you use right (focus far) and left (focus near) sideways movements of the puck. You must push and hold right or left to manually focus; a quick push right or left initiates autofocus. You can change this so that you focus far by pushing the puck in or focus near by pulling it out.

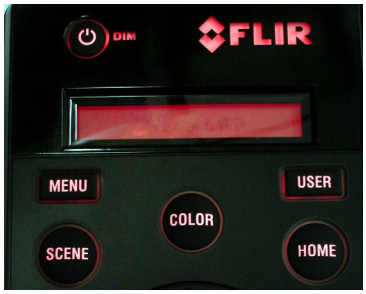
By default, a quick push of the puck to the right or left initiates autofocus. While the camera is in autofocus mode, an icon displays and a scale shows the progress in completing this operation. You should wait for the autofocus to complete before making other camera changes. You can change the default action so that a quick push in initiates autofocus.

The No Autofocus icon displays when you attempt to initiate focus and the NFOV camera is not active.



The Autofocus scale shows progress of the focus operation

Use the manual focus controls for coarse focus adjustment and the autofocus feature for fine focus adjustments of the thermal image.



JCU powered on with backlit display and buttons

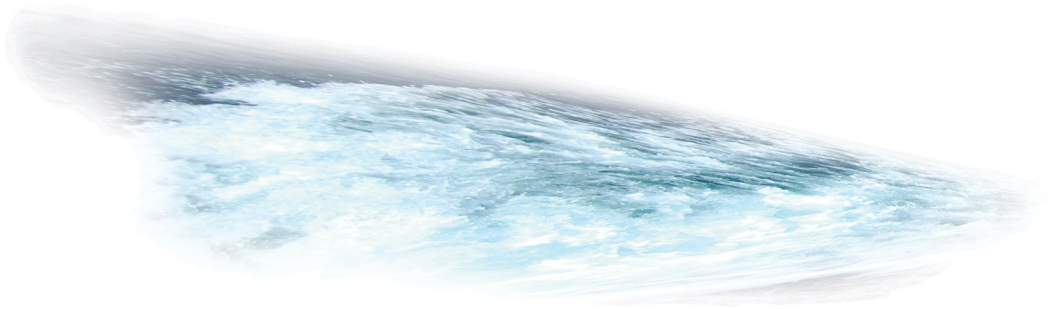
JCU Display

The JCU display area generally shows the ID of the camera that the JCU is connected to. It also shows various JCU status messages, and it shows the countdown (`3, 2, 1, 0`) to access the Power Menu when the power button is pressed and held. The Power Menu displays on the LCD so you can choose various standby modes.

See “JCU Power Menu” on page 26 for details about using this menu.

CHAPTER 3

Voyager III System Startup



System Startup and Shutdown

The Voyager III camera does not have an on/off switch. Instead, its power state is controlled by the JCU. Generally, the camera is never completely off but in a standby state waiting for a “wake” command from the JCU.

Typically, the Voyager III system is connected to its power source through a circuit breaker, which functions as the primary on/off switch for the system. Should it be necessary for some reason to completely shut down the system, the circuit breaker is used. In normal operation, however, the camera will have power and will be in one of three states or modes:

- Bootup, or powering on
- Powered on, or fully functional
- Standby, a low-power state waiting for a wake command

The Bootup Process

The bootup process is slightly different depending on whether the system had been completely turned off or is being wakened from a standby state. Most of what happens, however, is the same.

If you are starting from a full shutdown, make sure your monitor is turned on. Then power on the system. When the JCU receives power, an amber light on the Power/DIM button comes on. Press and hold the JCU Power/DIM button to wake the camera.

Troubleshooting Tip: If the JCU does not have power, it may be connected to a Power over Ethernet (PoE) switch that has not been powered on, or it may be connected to a network switch that does not provide PoE power.

When the camera begins to power up, it goes through a pan/tilt sequence and then moves to the home position. `Starting,` then `Searching..` displays on the JCU LCD screen. When the last-used camera is found, the message changes to `Connecting...`, which continues to flash until the connection process completes.

If this is the very first time the JCU has been used to connect to the camera, you must first associate the JCU with the camera by selecting the camera. See “Assign JCU” on page 27 for how to do this.

Troubleshooting Tip: if the JCU does not discover a camera, check to make sure the JCU and the camera are both properly connected to the bulkhead box either through a network or directly.

While the connection is being established, a series of screens displays as various components are activated. How the screen looks will vary depending on the particular configuration settings of your installation and if you have set a color default other than the factory default supplied with the system.

In general, the following sequence occurs:

1. Two FLIR splash screens display. Initially the screen at the left appears. Then another splash screen with two important notices appears.

Product Not for use as a
Primary Navigation Tool
FLIR
Voyager ®
This IR Thermal Imaging System is an Export Controlled item. Authorization by the U.S. Government must be obtained prior to any shipment outside the United States.

2. The screen then clears and after a few seconds a message displays:

   `Loading, please wait`

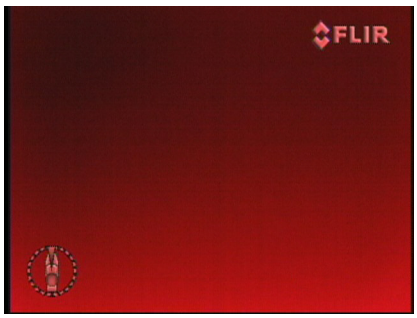
   During bootup, a thermometer displays on the right of the screen until the process completes. This is a feature of the thermal imager used to support firefighter mode.

3. The screen clears and displays live video using default colors and icons.

Important: Fully establishing a connection may take up to two minutes. Please be patient while the system verifies each component.

When the camera is fully connected, the `Connecting...` message on the JCU display is replaced by the camera ID such as `VGRIII E8003`. This information blinks briefly to indicate the connection is final, and then remains on the screen. The camera will now respond to the JCU buttons and puck movements.

When the bootup is complete, the monitor displays live video. The camera initially boots up in red-hot mode by default, unless you have changed the color default using the system settings (see page 50). This is because many users activate the system when little or no light is available, and the red-hot mode helps to preserve night vision. If the white-hot display mode is preferred, simply press the COLOR button on the JCU.



Red-Hot Mode

White-Hot Mode

Standby Mode

After the bootup sequence, the camera is ready to use. When you are done with the camera or want to conserve energy, you can put the camera in standby mode. You can optionally put only the camera in standby, put only the JCU in standby, or put the entire system in standby.

When the camera is in standby mode, the pan/tilt motors are engaged to hold the camera in place in rough seas. However, the camera does not generate a live video signal. The camera will only respond to a wake command when you hold and press the Power/DIM button on the JCU. While in standby mode, the camera points straight down, to protect the camera optics.

To initiate standby, press and hold the Power/DIM button. A brief countdown (`3, 2, 1, 0`) displays on the JCU screen and then Power Menu displays. The various options on the menu are described in more detail in the following section.

If `Camera`, `System`, or `Global Stndby` is selected, the LCD displays `Goodbye`, the camera moves to the parked position (head rotated down) and goes into standby state.

You can also press and hold SCENE, COLOR, and HOME buttons at the same time to go directly to global standby. In this case, you are not prompted to choose from the Power Menu before the camera enters standby.

If the camera will not be used for an extended period of time and you want to conserve power, first power down the camera from the JCU as described here so that the camera is in the park position. Then switch the system circuit breaker to the off position. When the circuit breaker is switched on, the camera will go through the bootup sequence again, as described previously.

JCU Power Menu

The JCU is more sophisticated than many joystick devices; in fact it has its own microprocessor and is capable of communicating with other IP devices on a network. To aid in the control of the system, the JCU has an LCD display that shows JCU messages, menu options, and general status information. The various JCU functions are accessed from a set of menus, with each menu entry selectable in the JCU display.

When the camera is powered on, pressing and holding the Power/DIM button causes the JCU to display the Power Menu. Use the JCU puck to scroll up and down within the menus (push fore and aft or twist), and select an entry by pushing in (clicking) the puck or pushing it to the right or left. When the JCU is in the Power Menu mode, the other JCU buttons such as HOME, COLOR, SCENE, and USER are disabled.

In the JCU display, a down arrow (v) indicates you can access additional menu choices by moving the puck down or by rotating the puck clockwise. An up arrow (^) indicates the last menu entry is displayed, and the other choices must be accessed by moving the puck up or by rotating the puck counterclockwise. A double arrow indicates you can move up or down in the menu.

The Power Menu displays the following menu options:

```
Power Menu
Assign JCU
JCU Stndby?
Camera Stndby?
System Stndby?
Global Stndby?
Calibrate JCU
Cancel
```

Power Menu

`Power Menu` displays when you enter the menu. Use the puck to scroll down through the other menu options. To exit the Power Menu, scroll down to the Cancel entry and push the puck in.

Assign JCU

Use the `Assign JCU` function to assign a JCU to a camera. When you select this entry, `v Select Camera`. displays. The `v` indicates you can scroll down with the puck to select a camera to control. When the ID of the camera you want to use displays, push the puck in to select it. The camera ID will blink momentarily to indicate it has been selected.

Normally only one camera is available, but you still must select it to complete the association.

JCU Stndby?

When the `JCU Stndby?` option is selected, the display momentarily shows `Goodbye` and then the backlit controls and the display are turned off. The JCU buttons and puck will no longer control the camera. The Power/DIM button remains backlit as long as power is supplied to the JCU. To power up the JCU again, press and hold the Power/DIM button.

Camera Stndby?

When the `Camera Stndby?` option is selected, the camera will move to the parked position and go into the standby state.

The JCU display will prompt the user to select a camera to control, in case you want to switch to a different camera. If you select the same camera, it will return to the powered on mode.

System Stndby?

When the `System Stndby?` option is selected, both the JCU and camera associated with it are powered off.

Global Stndby?

When `Global Stndby?` is selected, all discovered cameras and JCUs found on the network are powered down. This function is used to properly shut down all cameras (return to park position) and JCUs prior to removing power with the system breaker.

Global standby can also be achieved by pressing and holding the SCENE, COLOR, and HOME buttons in unison.

Calibrate JCU

`Calibrate JCU` is used to standardize the movements of the JCU puck. This function might be used, for example, if the camera responds at a different rate when the puck is pushed left rather than right, or when the puck is twisted in one direction compared to the other. The JCU display directs the user to move and twist the puck in certain ways so the device can be calibrated.

After entering calibration mode, you will be instructed to move the puck to the maximum extent possible in each direction separately. After that has been done, pushing the puck in moves to the next step. For example, `Rotate CW/CCW`

requires rotating the puck clockwise to the full extent possible, and then rotating counter clockwise to the full extent possible. When both directions are completed, push the puck in to continue.

Cancel

The `Cancel` option causes the JCU to exit the Power Menu and return to its normal state.

Factory Default Settings

Table 3.1 shows the factory default settings for the Voyager III configuration options and the JCU buttons. Chapter 5, "Voyager III System Configuration," on page 43 describes how to modify and update settings.

TABLE 3.1 Factory Default Settings

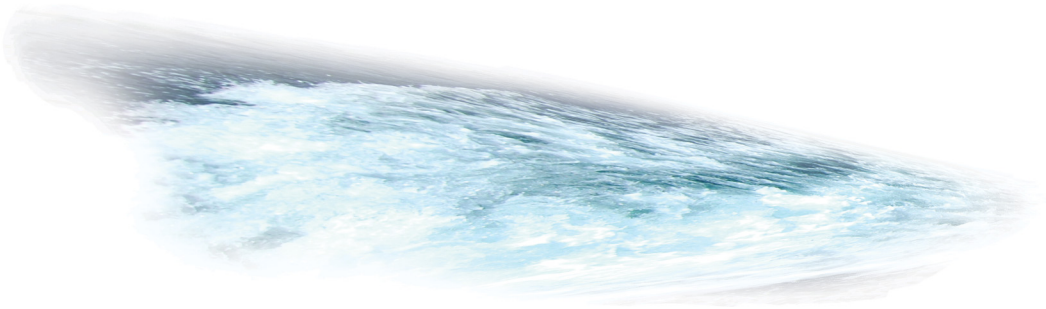
Option	Factory Default Setting
Airplane Joystick	Enabled
BWC Message	Disabled
COLOR button	Red (night)
Color Thermal Video	Disabled
Elevation Icon	Enabled
Firefighter Mode	Disabled
Foveal View	Disabled
Home Position	0^{o} azimuth, 0^{o} elevation
Icon Display Mode	Display Minimal
IP Address of Camera	192.168.250.116
IP Address of JCU	192.168.250.117
Iso Therm (Upper)	125^{o} C
Iso Therm (Lower)	37^{o} C
Joystick Mode	Airplane
Gyro Stabilization	Enabled
NMEA Mode	Disabled
Park Position	0^{o} azimuth, -90^{o} elevation
Picture in Picture Mode	Disabled
PIP Location	Lower Right
Point	Disabled
Primary Video	OSD Video

TABLE 3.1 Factory Default Settings

Option	Factory Default Setting
RSD Message	Disabled
Scan Width	Wide
Scan Speed	Slow
SCENE Button	Night Running
Secondary Video	Visible Analog
Symbology	Display Minimal Icons
Target Dwell	10 seconds
Thermal Color	Disabled
TTM Message	Disabled
Twist-to-Pan Mode	Enabled
USER button (press and hold)	Display User Programmable Button Menu
USER button (short press)	Toggle Video Polarity
Video Polarity	Black Hot
Webcam	Disabled

CHAPTER 4

Voyager III Firefighter Mode and Tracking



Overview

The chapter provides instructions for using two specialized features of the Voyager III system that are particularly useful in rescue operations:

- Firefighter mode
- Video tracking

Using Firefighter Mode

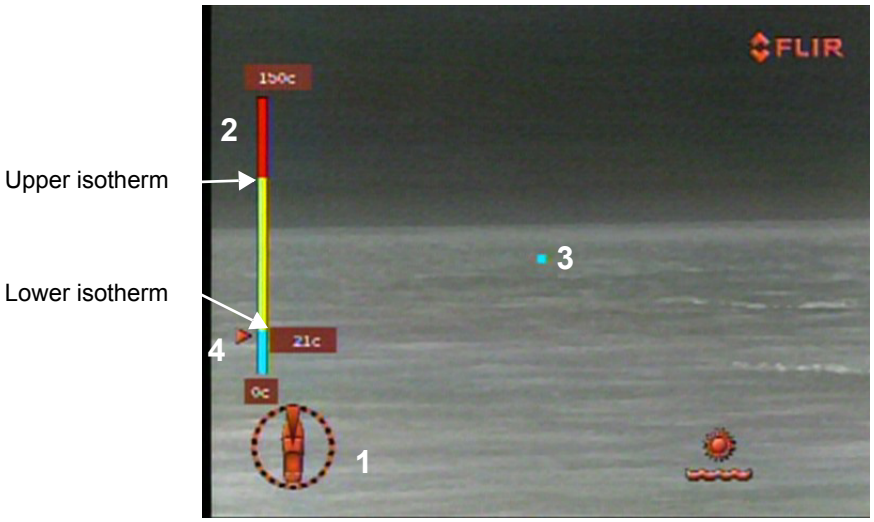
When the system is in firefighter mode, the estimated temperature of a target area is monitored and displayed on the screen. This feature may be especially useful to emergency personal monitoring fires, but could also be used in may other situations.

Firefighter mode can only be activated when the thermal wide field of view camera is active. If the narrow field of view camera or daylight camera is active, the system cannot be placed in firefighter mode. A “No Firefighter” icon (shown at the left) displays on the screen to indicate that you must change the camera or field of view before firefighter mode can be used. When the field of view is increased, the icon no longer displays.

You enable firefighter mode by pressing the MENU button and selecting the Firefighter Menu. This menu includes two other settings that can be used to fine-tune the temperature display. See “Firefighter Menu” on page 45 for details about this menu.

Caution: A number of factors can affect the accuracy of the Voyager III temperature reading such as the distance to the target, humidity, and other atmospheric conditions. While the Firefighter Mode features of your Voyager III system provide an important reference point in understanding temperatures in a target environment, you should never rely on camera data as your primary source of information. The Voyager III system should always be used in conjunction with other appropriate tools.

Enabling firefighter mode modifies a number of aspects of the video display. The following figure uses numbers to annotate four significant differences.



1. All icons other than Scene, Azimuth, and Elevation are removed from the screen.
2. A vertical temperature scale displays along the left edge of the video display with a range of 0 to 150 degrees centigrade. The scale is divided into three sections distinguished by colors: green, yellow, and red. The points on the scale where the colors change are determined by the values you specify for upper and lower isotherm values:
   - Upper isotherm marks the change between red and yellow.
   - Lower isotherm marks the change between yellow and green.
3. A spot meter displays in the center of the video display indicating the target for the temperature reading. This target is set by the camera and cannot be changed.
4. A pointer on the left of the temperature scale indicates the real-time temperature measured by the Voyager III camera at the spot meter. The temperature in degrees displays next to the pointer. The system continually updates temperature readings at a rate of 2 times per second and updates the spot meter information at the same rate.

The colors on the video display reflect these isotherm values, with the exception that values below the lower level are displayed in grayscale rather than green. Because firefighter mode requires a specialized color palette, some settings that affect the video cannot be used in this mode, such as the COLOR button and inverting video polarity

In the following graphic, you can see that some objects are warmer and are within the yellow range by the yellow color in the display.

Using the system in firefighter mode temporarily disables some other system features:

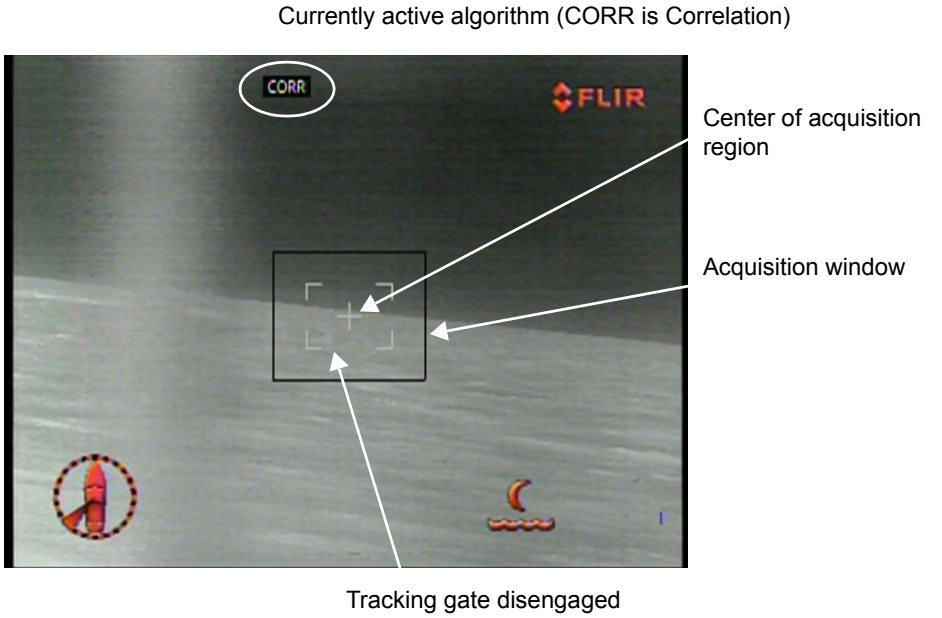
- If NMEA mode has been enabled, it is disabled until firefighter mode is disabled.
- The Video Setup Menu cannot be accessed from the main menu while using this mode.
- The COLOR button cannot be used to change colors (short press is disabled).
- The USER button cannot be used to invert the video polarity; the short press is disabled if Invert Video Polarity is associated with the button.

Using Voyager III Tracking

The ability to identify a target and keep the camera automatically focused on it is an important feature of your Voyager III system. Tracking can be used, for example, to keep a person in view who has been swept overboard until a rescue operation is completed or to follow a ship that is in distress.

When tracking is enabled, you manually identify a region of interest. The tracker detects targets in the region of interest based on an analysis of contrasting and homogeneous areas, motion, and other distinctive factors. When you engage the tracker, the system attempts to follow the target. You can fine-tune the region of interest and make other manual adjustments.

The following figure illustrates how the system might look when you first enable tracking. In this picture, the system is ready to track but is not yet engaged in tracking.



The letters at the top of the screen (CORR) indicate the method the system is currently using for acquiring targets in the region of interest. This method is called an acquisition algorithm, and you can select from four algorithms.

The outer black box in the center of the screen is the acquisition window. It has a default size of 160 x 120 pixels, and defines the area of the scene in which a target can potentially be acquired. The size of the acquisition window can be changed using the puck. The default size is optimized to provide the best processing power for the tracker (not too large) and ease of use for the operator (not too small).

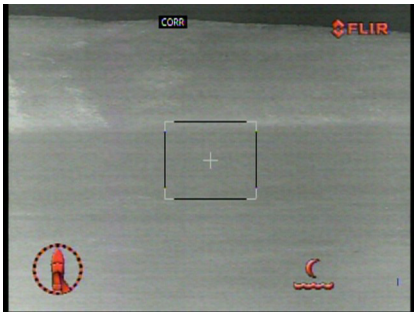
When the tracker is actually engaged in tracking, the acquisition window no longer displays.

The box within the acquisition window (white in the above figure) is the tracking gate. It has three states, indicated by the color:

- White indicates that the tracker is in acquisition mode and not actively tracking a target. The area within the tracking gate identifies a potential target.

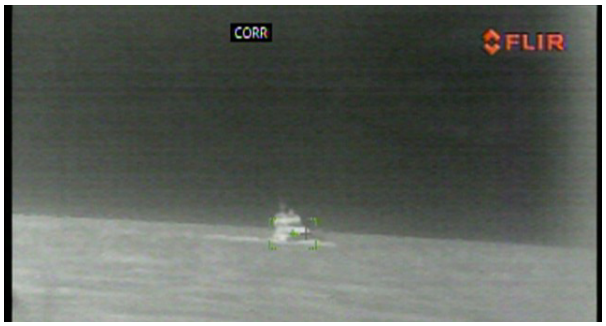
- Green indicates a target is being tracked.
- Orange indicates that a target is being tracked but that the tracker is coasting, and is potentially about to lose the target.

At times, the size of the acquisition window and tracking gate are the same. This indicates that the tracker has not found anything to track within the acquisition window. In this case the screen looks like the following.



You should move the camera until the white tracking gate shows inside the acquisition window before attempting to engage a target. The tracker automatically sizes the white tracking gate as it finds a discernible target.

You engage the tracker by double-pumping the joystick. When the tracker is engaged, the display changes to one like the following picture.



In this figure, the black acquisition window no longer displays, and the color of the tracking gate is now green, indicating that it is tracking the target area. The system displays gray cross hairs to marks the center of the scene. When the tracker is exactly on target, the green cross hair of the tracking gate overlay the gray cross hairs.

You may need to practice using the tracking features to become familiar with how they work and when they work best.

If you plan to use tracking, some initial setup is required. Entering a tracking session significantly alters the way the Voyager III system works. Tracking affects

both the video display and how you use the joystick. You should read this section thoroughly to understand how best to use the tracking features.

Setup for Tracking

If you plan to use the Voyager III tracking module, you must first:

- Associate Toggle Tracker with the long press of the USER button. This is the only way to turn tracking on and off. After you have done this, you can quickly enter tracking mode by simply pressing and holding the USER button. You return to normal or firefighter mode by pressing and holding the USER button again.
- Set up options on the Tracker/PIP Menu if you plan to use the picture-in-picture feature. See “Tracker/PIP Menu” on page 59 for details.

Note: While picture in picture is associated with the tracker, it can be used at any time, not just when you are actively tracking.

How Tracking Affects Other System Features

You can initiate a tracking session when the system is in normal mode or use it in conjunction with firefighter mode. You can use either of the thermal sensors or the visible camera. You can even track when the camera is using the foveal view with the two thermal fields of vision overlaid (see page 55). In all cases, enabling tracking changes various aspects of how the system operates.

You will see all of the following changes when a tracking session is initiated:

- In firefighter mode, the display color becomes grayscale, rather than using the isotherm colors. The spot meter pointer is also removed from the display, but the temperature scale remains and the system continues to update the temperature readings.
- All icons are removed from the screen except for the Scene, Azimuth, and Elevation icons.
- If the NMEA interface is being used to connect to another device, the system no longer responds to messages and the message icons are removed.
- The MENU button cannot be used for accessing the menus. It has a special use with tracking. If you need to make changes using the menus, you must exit the tracking session.
- After a target has been acquired, the short press function of the USER button changes from whatever it has been assigned. Instead, a short press of the USER button alternates the primary display between the on-screen display (OSD) and direct analog. OSD is a processed view of the camera output that includes icons and generating OSD results in a slight time delay. Bypassing the OSD processing by switching to direct analog can help the tracker retain a target.

Note: The effect of the long press of the USER button does not change; pressing and holding it returns the system to normal or firefighter mode, whichever was being used before tracking was started.

Tracking Concepts

When you press and hold the USER button, tracking is enabled. The screen changes and a black acquisition window displays in the center of the screen. This window defines the region of interest or acquisition region.

Note: This is true of all tracking algorithms but SCENE. When you use the SCENE algorithm, this acquisition window does not display since the entire scene is being tracked. Instead a single cross hair displays in the center of the scene.

The tracker has two modes:

- Acquisition mode
- Tracking mode

Initially the tracker is in acquisition mode. You use the joystick as you normally do to move the direction of the camera to point to the area you want to track. You may want to zoom in to more clearly focus on the region of interest. During acquisition you can press and hold the menu button and use the joystick to change the size of the acquisition window or to change the tracking algorithm being used.

The default acquisition window size (160 x 120 pixels) is effective in most situations. Typically, the region of interest will take up 20% or less of the screen. At this magnification ratio, you can move the camera with relative ease to place the target within the acquisition window. While you can change the tracking window size, you should consider the following:

- If the acquisition window is enlarged, the tracker will define a larger target and may lose the differentiation that lets it retain the target over time.
- If the window is made smaller, it becomes more challenging to position the target within the window.

See “Using the Joystick During Target Tracking” on page 41 for a details about how to refine a target area.

After you have identified a region of interest—indicated by the white tracking gate within the acquisition window—you can initiate tracking. You do this by double-pumping the joystick. When acquisition is successful, the acquisition window disappears and the color of the tracking gate changes from white to green. The tracker is now in tracking mode, rather than acquisition mode.

Note: Again, the behavior of the system when the active tracking algorithm is SCENE is different. Rather than a green tracking gate, you will see multiple green cross hairs scattered across the entire scene.

At times, you may also see the tracking gate display an orange color. This indicates that the tracker is about to lose the target.

By default, the tracker tracks at the center point of the current scene. This is indicated by a set of gray cross hairs. The tracker attempts to maintain the green cross hairs of the tracking gate as close as possible to the gray cross hairs. As your vessel moves, you may see the green and gray cross hairs separate. The tracker records this deviation and sends correction information to the camera to adjust the pan and tilt to keep the position of the two sets of cross hairs matched.

A number of factors can affect the ease with which a target can be acquired. Acquisition is easiest when the region of interest includes clear contrasts and boundaries and objects with a predictable rate of motion. For example, it is easier for the system to track a boat in the open ocean than when the shoreline is in the background because the boat has a clearer contrast. In addition, the size of the tracking gate can be important. If you want to track a moving boat, for example, reducing the acquisition window so that the boat fills most of the region maximizes the ability of the tracker to retain the target.

Tracking Algorithms

The system is supplied with four different ways of acquiring targets to track, called tracking algorithms. Under various conditions, one algorithm may be more effective than another in acquiring and keeping a target. In acquisition mode, you can press and hold the MENU button and use the joystick to cycle through the four tracking algorithms to experiment with their usefulness. Once a target is engaged, you cannot change the algorithm. An abbreviation of the currently active algorithm displays on the screen so you know which is being used.

The four algorithms and their displayed abbreviations are:

- Centroid (CENT)
- Correlation (CORR)
- Scene mode (SCENE)
- Combined (COMB)

Centroid (CENT)

When the tracker uses this algorithm, it tracks the center of the target. This approach works best with bounded, moving targets that have good contrast with the background. In this scenario, the tracker has a predictive capability. For example, if the target you are tracking is a small boat that is temporarily obscured by a large wave, the tracker will “coast,” predict where the target will be next based on its previous rate of change, and attempt to reacquire it. If the target cannot be clearly identified within the coast period, you will need to reacquire it manually.

Correlation (CORR)

When the tracker is using the correlation (CORR) algorithm, it takes a snapshot of the area within the tracking gate and uses it as a reference to compare with the area as it changes. The snapshot is slowly updated to reflect changes within the tracked area. Correlation is similar to the scene algorithm, but applied to the area defined by the tracking gate rather than the entire scene. This algorithm is good for tracking complex targets or slow moving or still targets in an uncluttered area.

When using this method, the system will coast in the same way as the centroid method if the target is lost.

Combined (COMB)

The tracker uses a combination of features from the centroid and correlation algorithms. This method typically does not yield as good result as either centroid or correlation. While possible, its use is not recommended.

Scene (SCENE)

When using the scene algorithm, the tracker identifies distinguishable points over the entire video frame (scene) and tries to maintain the relationship of the points to the video frame as the scene changes. This algorithm is most effective when the target area is large, such as a stationary target or landscape. You might use it, for example, while coming into harbour to keep the camera centered on a dock.

When the tracker is using this algorithm, an acquisition window and tracking gate do not display since you are engaging the entire scene, not a specific region. When tracking is engaged, you will see a number of cross hairs at various points that indicate points being tracked.

Joystick Operation for Tracking

When tracking is enabled, the behavior of the joystick changes so that you can control tracker-specific features.

When you are acquiring a target, you use joystick motions to:

- Enter tracking mode (double-pump the joystick).
- Change the tracking algorithm (press and hold MENU button and use puck).
- Increase or reduce the width and height of the acquisition region (press and hold MENU button and use puck).

Once you begin an active tracking session, you use joystick motions to:

- Exit tracking mode (double-pump the joystick).
- Change the vertical and horizontal position of the tracking gate (joystick).
- Move the horizontal and vertical offset of the region being tracked (press and hold MENU button and use puck).

Acquiring a Target

After you have positioned the region of interest within the acquisition window and you see the white tracking gate, you double-pump the joystick to engage a target within the acquisition window. The system automatically determines the size of the target to track using its internal calculations. However you can fine-tune the size using puck movements and then reacquire the target at a more precise size.

Consider this scenario. You want to track a boat and the area of the boat where the engine is located gives the best white-hot contrast. High contrast is one of the factors that helps the tracker stay engaged. When you first acquire the target, the tracking gate includes the white-hot area and a substantial region around it. You can use puck movements to ensure that the white-hot region is exactly in the center of the tracking gate.

Then to reduce the size of the tracking gate and have a more optimal target, follow these steps.

1. After three seconds of tracking, double pump the puck to release the target.

   The tracker will automatically reduce the tracking gate size by 25%, eliminating the less interesting area around the outside of the region you are most interested in.

2. Quickly double pump the puck to reacquire the target and put the tracker into tracking mode using a smaller tracking gate.

Using the Joystick During Target Acquisition

During target acquisition, you can hold down the MENU button and move the puck to increase or decrease the size of the acquisition region. The exact motions you use vary depending on whether Twist-to-Pan Mode on the System Setup menu is enabled (see page 56).

Note: The setting of Joystick Mode does not affect how you move the joystick while tracking.

You move the puck forward (fore) to increase the vertical dimension of the acquisition window, and backwards (aft) to reduce it. When Twist-to-Pan Mode is enabled, you twist the puck counter clockwise to increase the horizontal dimension of the acquisition region, and turn it clockwise to decrease it. When Twist-to-Pan Mode is disabled, you move the puck to the left and right to do the same thing.

The changes you make to the size of the acquisition region apply only to the current tracking session. If you engage a target and then double pump the joystick to release the target, the acquisition region will redisplay at the initial default size (unless you quickly reacquire, as described in the previous section).

You also can hold down the MENU button and cycle through the four tracking algorithms using puck movements.

Table 4.1 shows the puck movements to use during target acquisition by pressing and holding the MENU button and the effect of Twist-to-Pan Mode.

In this mode, pushing the puck in and pulling it out have no effect.

TABLE 4.1 Joystick Use During Target Acquisition (MENU Button Pressed)

Press and Hold Menu and Move Puck	Twist-to-Pan Enabled	Twist-to-Pan Disabled
Forward (Fore)	Increases vertical acquisition region	Increases vertical acquisition region
Backwards (Aft)	Decreases vertical acquisition region	Decreases vertical acquisition region
Left	Changes tracking algorithm	Reduces horizontal acquisition region
Right	Changes tracking algorithm	Increases horizontal acquisition region
Twist Counter Clockwise	Increases horizontal acquisition region	Changes tracking algorithm
Twist Clockwise	Reduces horizontal acquisition region	Changes tracking algorithm

Using the Joystick During Target Tracking

After you initiate a tracking session by acquiring a target, you can use the joystick in two ways:

1. You can move the tracking gate up and down or left and right to better center it over the target.

   For example, you are tracking a boat and want to center the boat's engine in the tracking gate to ensure a more distinct target region. You use the joystick to nudge the tracking gate to center it on the engine.

Caution: Behind the scenes, the tracker is actually releasing and reacquiring the target. Under some conditions, the tracker may lose the target during this operation.

2. You can modify the location on the screen that the tracker centers on. By default, the center of the tracker's target is the center of the screen. This is indicated by a set of gray cross hairs.

   For example, you are tracking a boat and the tracking gate is centered on the boat's engine. However, when the engine is tracked at the center of the screen, the bow of the boat is cut off on the right. You can fix this by temporarily changing the tracking offset. You hold down the MENU button and use the joystick to move the tracking gate to the left. This shifts the scene so that the missing part of the boat comes into view.

When your current tracking session is ended (either by you double pumping the joystick or by the tracker losing the target), the tracking offset is reset to the center of the screen.

The exact motions you use to change the tracking gate position and offset vary depending on whether Twist-to-Pan Mode is enabled. You use the joystick to move the tracking gate and hold and press the MENU button with joystick movements to change the tracking gate offset. Table 4.2 and Table 4.3 list the movements and their effects.

TABLE 4.2 Joystick Use to Change Tracking Point

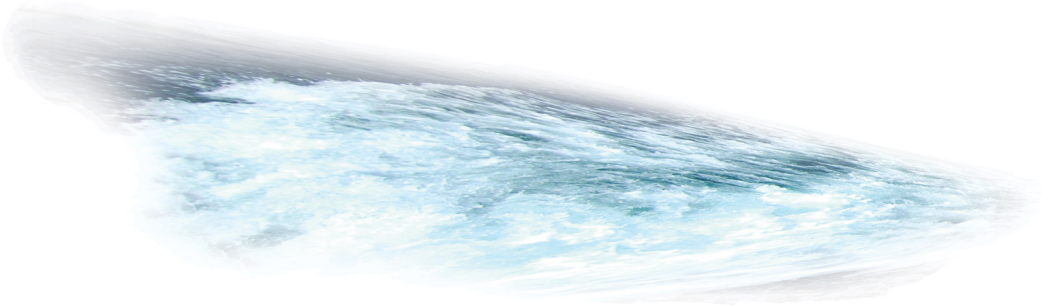
Puck Movement	Twist-to-Pan Enabled	Twist-to-Pan Disabled
Move Puck Forward (Fore)	Move track gate up	Move track gate up
Move Puck Backward (Aft)	Move track gate down	Move track gate down
Move Puck Left	Focus near (IR NFOV)	Move track gate left
Move Puck Right	Focus far (IR NFOV)	Move track gate right
Twist Counter Clockwise	Move track gate left	Zoom out
Twist Clockwise	Move track gate right	Zoom in

TABLE 4.3 Joystick Use to Change Tracking Gate Offset

Press and Hold MENU Button and Move Puck	Twist-to-Pan Enabled	Twist-to-Pan Disabled
Forward (Fore)	Move track offset up	Move track offset up
Backward (Aft)	Move track offset down	Move track offset down
Left	No Response	Move track offset left
Right	No Response	Move track offset right
Twist Counter Clockwise	Move track offset left	No Response
Twist Clockwise	Move track offset right	No Response

CHAPTER 5

Voyager III System Configuration



Overview

This chapter describes how to configure the system options using on-screen menus. To operate the Voyager III camera does not require modifying any of the factory configuration settings. However, these menus let you:

- Choose configuration options that match your personal preferences or provide optimal performance under varying conditions, such as a default color scheme.
- Enable or disable specialized features such as using the camera as a webcam, using the NMEA messaging interface, or operating the camera in firefighter mode.

After you make updates, most of the changes persist. A few settings, however, revert to the factory default when the system is rebooted. These include firefighter mode, surveillance mode, and point mode. In addition color and polarity settings revert unless you have used Set Thermal Video Default to define a new default.

Not all options can be used at the same time. For example, you cannot use the Voyager III tracking module while at the same time receiving data directly from radar and GPS using the NMEA interface. The way the various options interact is also described in the following sections.

Main Menu

When the MENU button is pressed, the main menu displays.

Some menu items—those ending with the word “menu” such as Firefighter Menu—display a list of additional items. Menu items that actually execute a function display the currently selected value to the right, as is the case with Point, which is currently disabled as shown by the on-screen value.

To navigate the menus, use the puck to move the cursor up and down from one selection to the next (the puck can be moved fore and aft, or it can be rotated). To make a selection, push the puck in (like a mouse click) or move the puck to the right or left. Once you are satisfied with your changes, press the MENU button to exit the menus. If you are in a submenu, you may need to press the MENU button multiple times to exit.

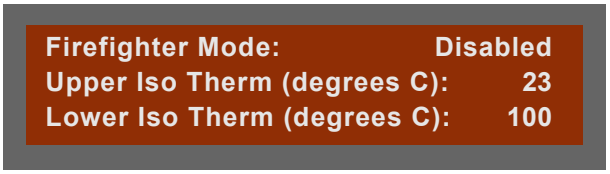
The currently active menu item is designated by the FLIR logo next to it. Push the puck in or move it left/right to select an item. Another menu displays if the item is a menu, or the value changes if it is a functional option.

The MENU button supports additional features when tracking mode is enabled. In this mode, holding down the MENU button and using the joystick lets you manage the area of the screen being tracked. See “Using Voyager III Tracking” on page 33 for details.

Firefighter Menu

You use the options on this menu to enable or disable firefighter mode and define the color ranges for temperature tracking. For a description of the features of firefighter mode, see “Using Firefighter Mode” on page 31.

When you select Firefighter Menu from the main menu, the following on-screen menu displays.



Firefighter Mode

Select this option to enable or disable firefighter mode. If you have enabled firefighter mode, the setting reverts to disabled when the system is rebooted.

Upper/Lower Iso Therm

Select the temperature values where the red (upper) and yellow (lower) colors begin on the temperature scale. By default, these are set to s 125° C (upper) and 37° C (lower).

Move the joystick to the right to increase the temperature; to the left to decrease it. In firefighter mode, the system uses these values to determine the color of pixels on the screen. Any pixel with a temperature within the defined color band is displayed in that color. If Lower Iso Therm is 30° C and Upper is 79° C, a pixel with a temperature of 35° C displays a yellow color.

NMEA Menu

This section describes how to configure and use the set of NMEA interface functions supported by the Voyager III. For information regarding installation of the NMEA interface, refer to the *Voyager III Installation Guide*.

The NMEA interface allows the Voyager III to communicate with radar, GPS, or other devices using the National Marine Electronics Association (NMEA) 0183 protocol. NMEA 0183 (or NMEA for short) is a combined electrical and data specification for communication between marine electronic devices. Additional information regarding the protocol can be found on the NMEA Web site:

http://www.nmea.org/content/nmea_standards/nmea_standards.asp

When NMEA is being used, the Voyager III acts as a listener and receives messages from the main control unit that is monitoring various sending devices in

the system, such as radar, GPS, or independent input ports. The Voyager III connects to the other equipment via a serial cable or a direct connection.

The NMEA protocol allows the camera to automatically point toward vessels and other objects that show up on the display and to track their movement.

Note: The system is also able to track targets that are manually identified by an operator. See “Using Voyager III Tracking” on page 33 for details.

The Voyager III can receive three types of NMEA messages.

- Radar Cursor Tracking, which is implemented using the NMEA Radar System Data (RSD) sentence format
- Slew to Waypoint, which uses the NMEA Bearing and Distance to Waypoint, Great Circle (BWC) sentence format
- Radar Tracking, which uses the NMEA Tracked Target Message (TTM) sentence format

Even though you can only choose three types of messages to enable through the NMEA interface, the Voyager III uses additional messages to perform the calculations needed to respond to these three. If your system is not responding as expected, verify that the NMEA device sending messages is sending the following additional message types:

HDT	Heading, True
GGA	Global Positioning System Fix Data
GLL	Geographic Position, Latitude/Longitude
VHW	Water Speed and Heading
OSD	Own Ship Data
TLL	Target Latitude and Longitude

Any combination or all three messages can be enabled; when more than one type is enabled, the system processes RSD first, then BWC, and finally TTM. For example, if the unit is listening to BWC or TTM messages and looking at a particular target and it receives an RSD message, it waits until the end of the dwell time and then move on to the RSD message, ignoring all other input.

Note: Using the joystick to pan or tilt the camera always takes priority over processing of an NMEA message. The next NMEA message will be processed after the system waits the target dwell time following the joystick movement.

Each message type has a unique icon associated with it. Depending on Icon Display Mode, these icons either always display or display momentarily when a message is received. In both cases, they flash on and off when the message is received.

Additional settings such as target dwell time affect how the messages are processed. Dwell time determines how long the camera remains on a particular target.

The ability of the Voyager III to accurately track a target depends on the quality of the data sent from the radar unit. The ability of the radar to effectively track a target is influenced by several factors, such as the make and model of the radar unit, the radar update rate, the relative angular rate of the target, the angular rate of the boat heading and the velocity of target being tracked.

Note: It is important to enter the accurate mounting height of the camera above the water line to ensure the unit's pointing accuracy for close-in targets.

While you can choose to track a large number of targets, in practical terms the number of targets is linked to the dwell time. Since the camera looks at each target for a minimum of 10 seconds before moving on to the next target, when the number of targets become too large, the system will take too long to cycle through them all for the information to be of any real use.

Configure how the NMEA interface works with settings on the NMEA Menu. When you select NMEA Menu from the main menu, the following on-screen menu displays.

NMEA Mode:	Enabled
RSD Message	Enabled
BWC Message	Enabled
TTM Message	Enabled
Target Dwell (seconds)	10
Mounting Height (meters):	01
Mounting X offset (meters):	0
Mounting Y offset (meters):	0
Mounting Angle (degrees):	0

NMEA Mode

Select this option to enable or disable the processing of messages using the NMEA interface. The factory default setting is disabled. All messages are ignored when NMEA Mode is disabled even if the specific message types are enabled.

RSD Message

When this option is enabled, you can control the camera by using the cursor on your radar display screen to highlight a target. The camera will track (point toward) whatever target is selected by the cursor. Moving the cursor to a different target will move the camera to the new target (see note below). The camera will continue to follow the cursor until this option is disabled from the main menu. This function is implemented with NMEA RSD messages.

When the camera is in this mode, an icon is either briefly or continuously displayed, depending on the setting of Icon Display Mode (see page 52).

Note: The camera points toward the cursor position for the dwell time period (a minimum of 10 seconds). If the cursor is moved during that time, the camera will not move immediately to the new position. It will ignore all other RSD messages (produced when the cursor is moved to another position) until the dwell time expires. Then it will respond to the next RSD message received.

BWC Message

When this option is enabled, the camera will slew (move) to a preselected waypoint when that waypoint gets to within approximately a 3 mile (5 km) range, based on waypoint location information from the NMEA BWC messages.

For example, while en route the operator could designate a buoy, an island or any other landmark as a navigation waypoint and the camera will point toward it automatically when in range. The camera will remain on the target for the specified dwell time. If an additional BWC message is received, the camera will point to the newer BWC heading for an additional dwell time period.

When the camera is in this mode, an icon is either briefly or continuously displayed, depending on the setting of Icon Display Mode (see page 52).

TTM Message

When this option is enabled, the camera tracks selected radar targets using data from NMEA Target Tracking Messages (TTM) provided by the radar unit.

While it is possible to select up to 100 targets to be tracked by Voyager III (refer to the radar or GPS documentation on how to designate a target), typically the operator selects five or less. Once targets are selected, the camera will point toward each sequentially, and track it using position data sent from the radar unit.

The camera points at each target for a preset amount of dwell time (10 seconds by default) before moving on to the next target. The dwell time is determined by the setting of Target Dwell.

Due to the way radar operates, it is possible to lose a target momentarily. To ensure that the tracking process continues after the momentary loss of a target, the TTM function maintains the last known position of the target in its queue for 60 seconds after receiving the last valid message. After the 60 seconds has lapsed, that target is removed from the queue.

Once the Voyager III begins to sequentially track the selected targets, you can override the automatic scan by using the joystick to point the camera in a different direction. When the joystick is released, the camera returns to tracking its targets 10 seconds after the last JCU input (buttons or joystick).

When the camera is in this mode, an icon is either briefly or continuously displayed, depending on the setting of Icon Display Mode (see page 52). In

addition, the ID of the target being tracked displays next to the icon. This will be a two digit number between 01 and 99.

Target Dwell

Target Dwell is the time (in seconds) spent on each tracked target. Dwell time includes both transition time—the time it takes the camera to move to the target—and the time the camera is actually focused on the target. The default value is 10 seconds but you can change it using the puck by selecting from the different time options, with a possible range of 10 to 60 seconds.

Mounting Height

Mounting Height specifies the physical height of the camera above the waterline, in meters. An accurate value is important because this distance is used for target triangulation and incorrect values can affect the camera's tracking performance. Height range is between 1 and 200 meters.

Mounting X and Y Offset

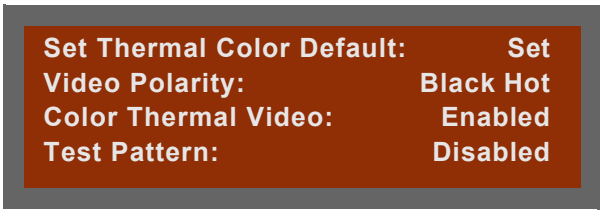
These settings can be used to compensate when the source of the NMEA messages is located some distance from the Voyager III system and is not aligned with it. For example, if the Voyager III system is located to one side of a large boat some distance from a radar system, you can specify values for the mounting offset to ensure greater accuracy of tracking.

Mounting Angle

You can use this setting to compensate when the camera is not mounted straight ahead. The mounting angle adjusts the location of the position indicator on the screen to accommodate physical mounting orientation of the camera base.

Video Setup Menu

When you select Video Setup Menu from the main menu, the following on-screen menu displays.



Note: This menu is disabled in firefighter mode since in this mode the video color display uses a unique color palette that is managed based on the firefighter isotherm settings.

Set Thermal Color Default

Set Thermal Color Default saves the current color and polarity settings as the default value used when the system is booted up. When this menu entry is selected, Set displays to the right of the menu until you exit.

Video Polarity

Selecting this item switches the colors representing hot and cold in the infrared imagery. Unless you set the thermal color default, this setting reverts to the factory default when the system is rebooted.

How video polarity works depends on the color pallet you are using.

- Black-Hot polarity: darker colors represent hotter objects (the factory default).
- White-Hot polarity: lighter colors represent hotter objects.

The difference between white-hot and black-hot is shown below using a grayscale color pallet; white-hot is on the left and black-hot on the right. The use of white-hot or black-hot display mode is strictly a personal preference; experiment with the different settings in different conditions and see which is preferred.

If Color Thermal Video is enabled, you have additional color choices. Inverting the polarity switches the darker and lighter colors.

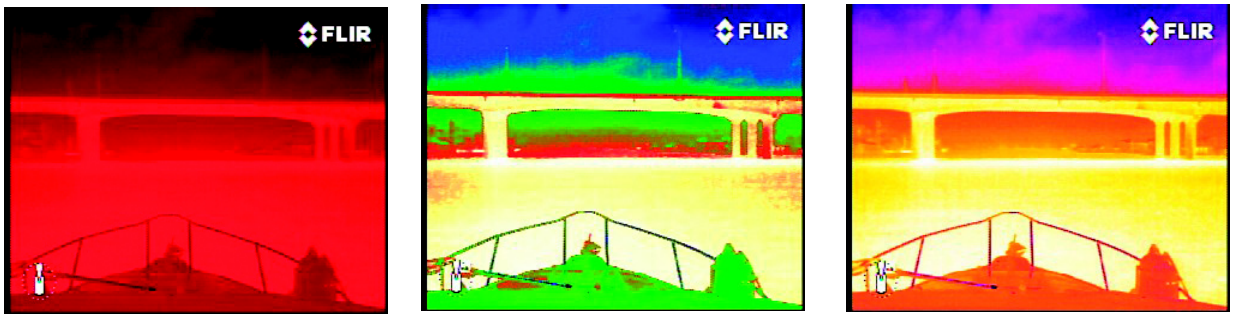
Note: By default, the USER button is configured to invert the video polarity. However, the function of the USER button can be changed from the factory default setting to do other functions. Refer to “User Programmable Button Menu” on page 53 for more information about how to program the USER button.

Color Thermal Video

Many people prefer to look at thermal images in color instead of grayscale. When this menu item is enabled, the camera can use one of four color palettes, instead of just two settings. The pallet to use can be changed by pressing the JCU COLOR button. See “COLOR Button” on page 17 for details.

Color Thermal Video Disabled. Day and night pallets (white/black or red/black) display as you press the JCU COLOR button. This is the factory default setting.

Color Thermal Video Enabled. Four pallets display as you repeatedly press the JCU COLOR button (the three below as well as grayscale).



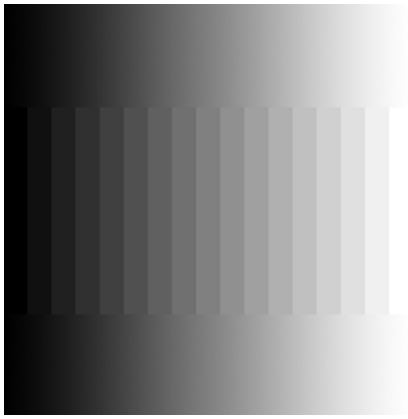
You can set a color default with the Set Thermal Color Default option. Unless you set the thermal color default, this setting reverts to the factory default when the system is rebooted.

This setting is used in combination with the Video Polarity setting. Inverting the four color pallets provides eight possible ways of showing the same image on the display.

Test Pattern

Quite often the video from the Voyager III camera can be optimized by adjusting the monitor that is being used to show the video. The Display Test Pattern function is useful for setting up the monitor to give the best detail and contrast.

Push the puck in to select this option to enable the test pattern. The pattern immediately displays so you can adjust the monitor brightness and contrast to give the best image. Select the option again when you are done to disable the display of the test pattern.



Set Symbology Menu

When you select Set Symbology Menu from the main menu, the following on-screen menu displays.

PC Icon:	Disabled
JCU Icon:	Enabled
Icon Display Mode:	Display Minimal
Elevation Icon:	Enabled

PC Icon and JCU Icon

The display of the PC icon and the JCU icons can be enabled or disabled using the first two menu entries. This setting only has an effect when Icon Display Mode is set to Display All. In this case, you can override the Display All setting by disabling the PC, JCU, and Elevation icons.

The JCU Icon setting affects both the single JCU and multiple JCU icons that display based on the number of JCUs connected to the camera.

The PC icon only appears if the system has discovered a PC on the network. This happens only when you have completed the setup to enable the use of the system as a webcam. See Chapter 6, "Voyager III Webcam Interface," on page 63.

Icon Display Mode

The general display of icons on the screen is controlled by the setting of Icon Display Mode. You have three choices.

Display All. Selecting this option maximizes the display of the on-screen icons. Some icons such as Home and Scene are only displayed momentarily; the display of other icons depends on your specific system configuration. For example, the Wide FOV and Narrow FOV icons do not display when Foveal view is enabled.

If you choose to display all icons, you can still turn off the display of the Elevation, JCU, and PC icons by disabling their individual settings.

Display Minimal. Selecting this option turns off most of the on-screen icons except when their corresponding controls are actively in use. The Position (azimuth) icon and the FLIR logo are always displayed. Also, if gyro stabilization is disabled, an icon always displays as an indicator since this is an atypical setting. The default setting is Display Minimal. When point mode is enabled, the lock icon is also persistent.

Other icons such as Home and Scene display on the screen only momentarily when they are changed.

Note: The PC, JCU, and Elevation icons do not display in minimal mode even when their icon settings are enabled.

Hide All. None of the icons display permanently, except for the FLIR logo and the Position Indicator and icons for the following special modes:

- Gyro stabilization disabled
- Point mode enabled

Transitory icons display when selected functions are used, such as pressing the HOME button.

Elevation Icon

Selecting this menu item enables or disables the display of the elevation icon, which shows the tilt of the camera.

User Programmable Button Menu

When you select User Programmable Button Menu from the main menu, the following on-screen menu displays.

The USER button can be programmed with two options: one occurs when the button is pressed briefly, the other when it is pressed for a longer time. This lets you quickly access two common or frequently used settings or functions.

Long Press

Select one of two actions to associate with the USER button when it is pressed and held:

Select UPB Menu. A long press of the USER button displays the User Programmable Button Menu so you can modify the button settings. This is the factory default setting.

Toggle Tracker. A long press of the USER button enables or disables tracking mode. See “Using Voyager III Tracking” on page 33 for details about using tracking. Note that this is the only way to enable tracking so if you plan to use

tracking, you must associate Toggle Tracker with the long press of the USER button.

Short Press

For a short press of the USER button, select one of these:

Toggle Video Polarity. A short press of the USER button inverts the colors currently being used to indicate hot and cold in the infrared imagery. For example, if the current display is white-hot, it is inverted to black-hot (see “Video Polarity” on page 50). This is the factory default setting.

Man-Over-Board. A short press of the USER button causes the thermal camera to use the Man Overboard AGC setting. This is one of the settings available from the SCENE button (see page 17).

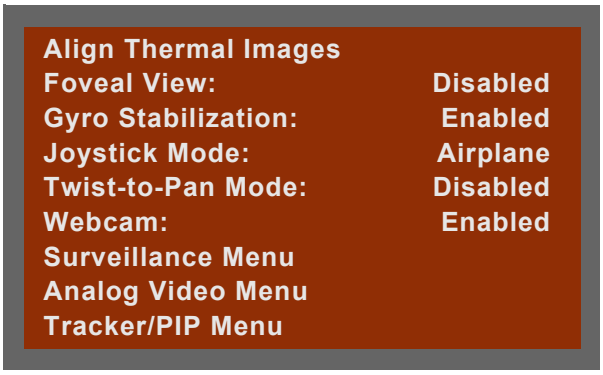
Display/Hide Icons. A short press of the USER button switches between two modes of Icon Display Mode: Hide All and Display All (refer to “Set Symbology Menu” on page 52 for more information).

Surveillance Mode. A short press of the USER button enables or disables surveillance mode. Refer to “Surveillance Menu” on page 57 for more information about this mode of operation.

Note: When you are tracking, the short-press function associated with the USER button is ignored. Instead, a short press of the USER button alternates the primary display between the on-screen display (OSD) and direct analog. See “How Tracking Affects Other System Features” on page 36 for details.

System Setup Menu

When you select System Setup Menu from the main menu, the following on-screen menu displays.



Align Thermal Images

If Foveal View is enabled, the thermal images may require a small amount of alignment to counteract parallax. Select this item and use the joystick to steer the inner image around until it is aligned with the outer image.

Foveal View

This setting lets you choose alternate ways of viewing the dual display of Voyager III's two thermal imagers:

- Enabled presents an overlaid view, with the narrow FOV image nested within the wide FOV image. This blended image presentation lets you zoom from the wide FOV to the narrow without losing image resolution. In Foveal view, the WFOV and NFOV icons do not display.
- Disabled (the factory default setting) presents either the wide or narrow FOV and lets you use the zoom function to transition from one to the other. In this view, when Icon Display Mode is set to Display All, either the WFOV and NFOV icon displays on screen to indicate which display is active.

Gyro Stabilization

Select this option to enable or disable the two-axis mechanical gyro stabilization, which prevents camera images from being affected by mechanical vibrations caused by waves and ship motion. This setting is enabled by default and should not be changed under normal operation. The icon to the left flashes when you enable this setting but does not display continually since this is the normal mode of operation.

If you disable gyro stabilization, the icon on the left remains on the screen to make you aware that it is disabled. This is not a normal mode of operation. Gyro Stabilization is automatically turned off when the camera is parked, but the system restores your setting when the camera is powered on.

This setting is also affected by the setting of Point. Gyro stabilization has two aspect: horizontal (azimuth) and vertical (elevation). Enabling Point turns off the horizontal (pan) stabilization while retaining the tilt stabilization. See "Point" on page 60 for details.

An unlock icon may also displays momentarily when you modify the gyro stabilization setting if Point is disabled. If Point is enabled, the lock icon displays and remains on the screen indicating that the camera movement is constrained (Point enabled).

Joystick Mode

In managing the elevation (tilt) of the camera, the joystick can be used in one of two modes.

Airplane Mode. Moving the puck forward causes the camera to tilt down. Moving the puck back causes the camera to tilt up. This is the factory default mode.

Gaming Mode. Moving the puck forward causes the camera to tilt up. Moving the puck back causes the camera to tilt down.

The choice of mode to use is a matter of personal preference. One mode may feel more natural than the other.

Twist-to-Pan Mode

This menu entry enables or disables the Twist-To-Pan Mode. The factory default JCU setting is enabled. This setting has a significant effect on how the puck is used (summarized in Table 5.1).

Enabled. Pan the camera by rotating (twisting) the puck to the left or right. Zoom in and out by pushing the puck in and pulling it out. Move the puck right and left and hold to focus far and near. A quick push left or right initiates autofocus.

Disabled. Pan the camera by moving the puck to the left or right, rather than rotating (twisting) it. Zoom in and out by twisting the puck right or left. Push the puck in to focus far and pull out to focus near. A quick push in initiates autofocus.

Note: When you are using the Voyager III tracker, Twist-to-Pan Mode also affects how you use the joystick puck to manage tracking features. See Table 4.1 and Table 4.3 on page 42 for a summary.

TABLE 5.1 Effect of Twist-to-Pan on Puck Movement

Puck Movement	Twist-to-Pan Enabled	Twist-to-Pan Disabled
Push Puck Left	Focus Near (IR NFOV)	Pan Counter Clockwise
Push Puck Right	Focus Far (IR NFOV)	Pan Clockwise
Twist Counter Clockwise	Pan Counter Clockwise	Zoom Out
Twist Clockwise	Pan Clockwise	Zoom In
Push Puck In	Zoom In	Focus Far (IR NFOV)
Pull Puck Out	Zoom Out	Focus Near (IR NFOV)
Quick Push Left or Right	Initiate Autofocus (IR NFOV)	No Effect
Quick Push In	No Effect	Initiate Autofocus (IR NFOV)

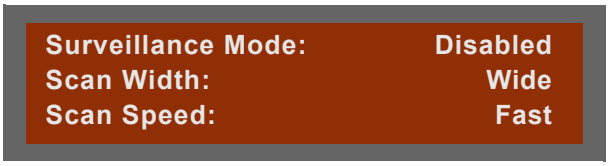
Webcam

Use this option to enable or disable the use of the Voyager III from a PC on a local or remote connection. Setting up the integration of the system so that it can be accessed from a computer is a separate activity. Enabling the webcam feature sets up the system to allow the video to be displayed remotely.

See Chapter 6, "Voyager III Webcam Interface," on page 63 for details about how to use the Voyager III camera from a PC.

Surveillance Menu

When you select Surveillance Menu from the main menu, the following on-screen menu displays.



The User Programmable Button can be programmed to enable or disable surveillance mode (see “User Programmable Button Menu” on page 53).

When the camera is in surveillance mode, it pans continuously left and right, either until it is taken out of surveillance mode or until the JCU is used to move the camera. The camera does not automatically resume panning; you must enable surveillance again by pressing the USER button (if it is programmed to enable this mode) or selecting the menu option.

Surveillance Mode

Select this setting to enable or disable the continuous panning action of the camera. If you have enabled surveillance mode, the setting reverts to disabled when the system is rebooted.

Scan Width

In surveillance mode, the Scan Width determines the range of horizontal azimuth (pan) covered by each scan. The choices are:

Narrow. The camera scans from approximately 20^{o} left and right of center (40^{o} total).

Wide. The camera scan covers 40^{o} to the left and right of center (80^{o} total). The default scan width is wide.

Note: The center of the scan pattern is determined by the direction the camera is pointing when surveillance is enabled. The scan pattern is not centered about the Home position, unless the camera is in the Home position when surveillance is enabled.

Scan Speed

In surveillance mode, the Scan Speed determines how quickly the camera scans back and forth. The choices are Fast and Slow.

Note: The scan speed is affected by the zoom state; if the camera is zoomed in, it scans at a slower rate. The default scan speed is Slow; try both settings to determine which is best for your installation.

Analog Video Menu

When you select Analog Video Menu from the main menu, the following on-screen menu displays.

The system has two independent video channels labeled primary and secondary that can each be split into four output streams. Because of physical constraints of the bulkhead box, six video output lines are supported, using any combination from the two lines. For example, you could have 3 primary and 3 secondary or 4 primary and 2 secondary.

The system has even greater flexibility, however, because the two independent channels—primary and secondary—can each display a different type of output. Using this feature, you can have one monitor display the daylight video and another the wide vision infrared.

Using different types of output is not required but may be useful if you have two monitors in different locations or if you want to use the picture-in-picture feature that is enabled on the Tracker/PIP Menu (see page 59). In this case, you can display two types of output on one monitor while tracking: the secondary output displays within a separate window on the same monitor as the primary output.

Choose one of four types of display for the primary and secondary output:

- OSD Video is a blended, processed view of output from the three cameras included in the Voyager III—WFOV, NFOV, and visible—and includes on-screen icons and menus. This is the factory default setting for the primary display.
- WFOV Analog displays direct output from the WFOV camera without icons or menus.
- NFOV Analog displays direct output from the NFOV camera without icons or menus.
- Visible Analog displays direct output from the daylight camera without icons or menus. This is the factory default setting for the secondary display.

Caution: If you change your primary video display from OSD, the menus are no longer visible. Make sure you select OSD Video for the secondary display so you can change settings through the menus as needed.

Tracker/PIP Menu

Your Voyager III system includes a tracker that lets you choose a target area of the display and have the tracker keep the camera focused on that area. Tracking is discussed in “Using Voyager III Tracking” on page 33.

Some features of the tracker are available whenever you use your Voyager III system, regardless of whether you enable a tracking session. These features can be configured on the Tracker/PIP Menu.

When you select Tracker/PIP Menu from the main menu, the following on-screen menu displays.

Picture in Picture Mode

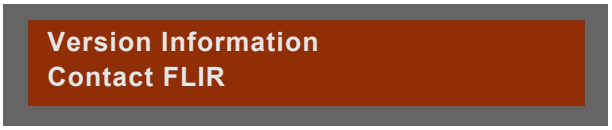
Enable this setting if you want to have a small picture from a secondary video source display on the monitor, overlaid on the primary view. This is useful, for example, if you want to be able to simultaneously see both the visible and thermal displays. The smaller “picture within the picture” is derived from the Secondary value specified on the Analog Video Menu.

PIP Location

Select the location where you want the smaller picture to display. Choices are Lower Right and Middle Left. This setting only has effect when Picture in Picture Mode is enabled.

About Help Menu

When you select About Help Menu from the main menu, the following on-screen menu displays.



Version Information

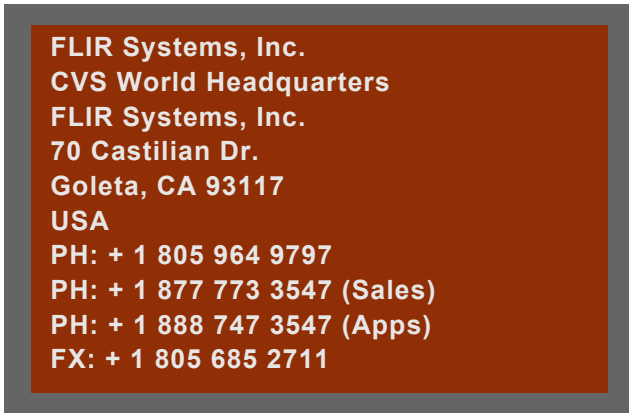
Selecting Version Information displays the software version information for the Voyager III camera you are using. If you are having any problems with the

camera, have this information available when contacting FLIR technical support. An example of the display is shown below.

Filesystem Version: VOY 3.30 R13
Created on: Mon Jun 2 09:01:39 PDT 2011
Foveal Software Version: VOY_3_0_R13
Created on: Mon Jun 27 09:01:39 2011
Custom upgraded to version VOY 3 0 R13
MMC Version: FOV-VOY_2_2_R1
SMC Version: 919
HMC Version: FOV-VOY_2_0_R1
FPGA Version: 10001009

Contact FLIR

Selecting Contact FLIR displays the FLIR contact information on the screen. Additional contact information is included at the back of this manual. If you have a technical support question, use the number labeled Apps. This will take you directly to the application support engineers. When contacting FLIR, please have the product information available.


FLIR Systems, Inc.
CVS World Headquarters
FLIR Systems, Inc.
70 Castilian Dr.
Goleta, CA 93117
USA
PH: + 1 805 964 9797
PH: + 1 877 773 3547 (Sales)
PH: + 1 888 747 3547 (Apps)
FX: + 1 805 685 2711

Point and Park

Point

Enabling Point only has significance when gyro stabilization is enabled (see page 55). The gyro stabilization has two aspects:

- Horizontal (azimuth)
- Vertical (elevation)

Enabling Point turns off the horizontal (pan) stabilization while retaining the tilt stabilization. This can be helpful when you want to use Voyager III as an aide to navigation and keep the camera pointing in the same position relative to the vessel as it turns.

For example, you may have set the camera to point straight ahead relative to the front of the vessel and enabled gyro stabilization. If the vessel is turned at a sharp angle under these conditions, the camera sensor will not follow the direction of the boat. Enabling Point keeps the camera in sync with the boat direction while maintaining a stable elevation position.

When point is enabled, a lock icon displays. The camera's azimuth position is now locked to the base. When you disable Point, the unlock icon displays momentarily.

If point mode is enabled and the camera is rebooted, the system restarts with this setting disabled.

Park

When Park is selected, gyro stabilization is disabled and the camera returns to its parked position, looking forward and down (–90^{o}). This position protects the camera from damage when it is not in use.

While in Park position, the Park icon displays on the video screen. Touching the joystick or any of the buttons on the JCU returns the camera to its previous state (before going into park).

CHAPTER 6

Voyager III Webcam Interface

Voyager III Webcam Introduction

The Voyager III camera and JCUs are network devices that communicate over an Ethernet network using the Internet Protocol (IP). By connecting your PC to the system with a network cable, you can view camera output directly from the PC and control some aspects of camera operation, similar to the way a standard webcam works.

Using the webcam interface could be convenient, for example, if you have a laptop located at a distance from the camera, perhaps below deck and want to view the camera output from that location.

To do this in a very simple scenario, you disconnect the Joystick Control Unit (JCU) from the system, plug in your PC, and use it instead. If you have more complex networking requirements, you can accommodate these with additional setup. For example, you can have multiple JCUs and a PC communicating with the camera at the same time using an Ethernet switch. Since the JCU draws its power over the Ethernet, if the network switch does not have Power over Ethernet (PoE) capability, a PoE injector must be used to provide power to the JCU.

If your local area network (LAN) on your vessel is set up with access to the Internet, the Voyager III webcam feature can be extended so that you can access the camera remotely through the Internet. This setup would let you keep an eye on your vessel from anywhere in the world as long as you can find an Internet connection.

This chapter describes the simplest configuration of replacing the JCU with the PC and how to use the webcam interface. It also discusses browser configuration issues and some more advanced configuration topics.

Basic Webcam Configuration

To use the webcam feature, you access the camera through the browser on your PC.

Browser Requirements

The webcam interface has two browser requirements:

- To prevent page display issues, make sure you have Microsoft Internet Explorer 8.0 or higher installed. If IE is not set up to be your default browser, you should remember to start IE and not other browsers when using the webcam.
- The webcam feature uses a free video display utility from VideoLan to stream video from the camera and display it in the browser. When you test the webcam locally you may not have Internet access (for example, when you are on a boat). Make sure you download and install the VLC application before you begin. You can download it from this URL:

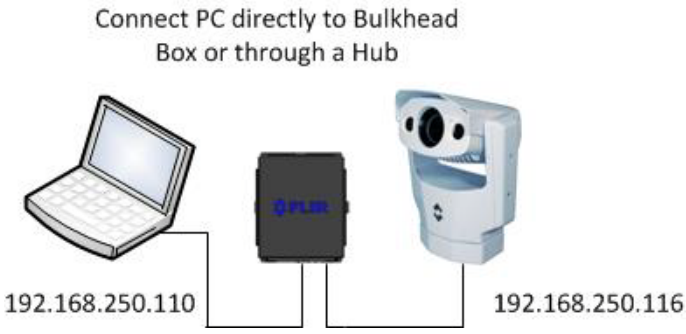
  http://www.videolan.org/vlc/download-windows.html

  See “Installing the VLC Player” on page 69 for details.

Configuration Steps

Configuring the Voyager III webcam feature for local use involves the following steps:

1. Configure your local PC to use an IP address in the same range as the Voyager III camera.
2. Directly connect the PC to the E2 Ship Ethernet port of the bulkhead box.
3. Access the webcam control page with Internet Explorer.



Each of these steps is discussed in more detail in the sections that follow.

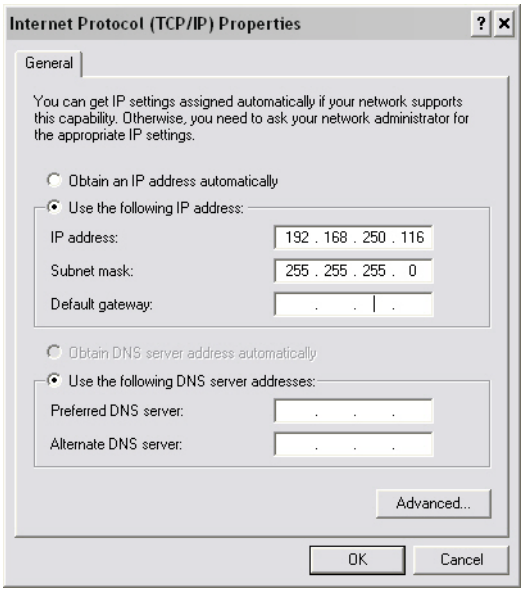
Configure IP Address of the PC

The Voyager III camera is preconfigured with the following static IP address:

192.168.250.116

Most PCs are configured to obtain an IP address automatically from the network. You need to change the network settings for the PC to correspond to the Voyager III camera. How you do this will vary depending on which operating system your PC is using.

1. Find the Network Settings dialog using the steps appropriate for your operating system (Windows XP, Windows Vista, or Windows 7). The following image is from Windows XP:


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 250 . 116
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

2. Click the selection for “Use the following IP address” and specify 192.168.250.110 in the IP address field.
3. Make sure the subnet mask is set to 255.255.255.0 (this should fill automatically as you tab through the screen).
4. Click OK to save your changes and exit the Network Settings dialog.

If the PC you are using is a laptop that you remove from the vessel and use on other networks, make sure you reset the network settings to obtain an IP address automatically to avoid IP conflicts.

Connect the PC to the Ship Ethernet Port

The Voyager III bulkhead box provides a single power over Ethernet (PoE) output to be used by the JCU, labeled E2 Ship Ethernet. In a simple configuration, you disconnect the JCU network cable from the bulkhead box and replace with your PC network cable.

If you have a more complex LAN and have connected one or more additional JCUs using an Ethernet switch (or equivalent) and PoE, you can connect the computer to the switch instead. See the *Voyager III Installation Guide* for more information about the physical configuration of the bulkhead box.

Display the Webcam Home Page

Once the PC is connected to the bulkhead box, using Internet Explorer version 8 or higher, enter the following in the browser address field (the port number 8082 is required):

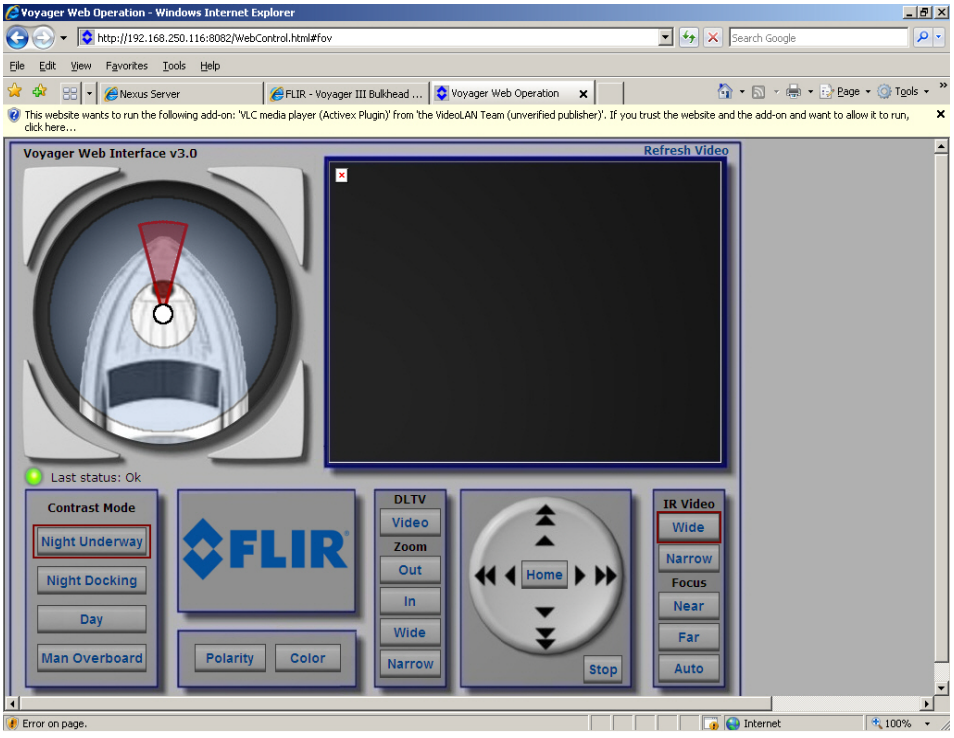
http://192.168.250.116:8082/WebControl.html

The webcam control page will display.

Note: If the VLC player application is not already installed on your PC or your browser security settings are set to prevent ActiveX controls from running, you will see various messages displayed at the top of the screen. VLC must be installed as a separate step before you begin. See “Installing the VLC Player” on page 69 for details. Even when VLC is installed, you may still need to click the message to allow ActiveX controls when prompted.

Using the Webcam Interface

The webcam control screen looks like the following figure.



If you see an ActiveX warning, right click the message and choose the option to install the ActiveX control. It may take a moment for the video to start streaming.

The webcam graphical user interface (GUI) lets you control the camera's pan and tilt motion, change the imaging mode color and polarity, and set different levels of contrast. In addition, you can select the imager you want to produce streaming video: either infrared (IR) wide or narrow imagers or day light (DLTV).

To view the video in full screen mode, double-click the video image. To exit full screen mode, double-click the image again.

Note: The camera streams video from only one imager at a time; it is not possible to stream the combined wide and narrow thermal video. In addition, no icons display in the video stream. All controls must be done from the Web page.

The red highlight around a particular control indicates the active setting. In this image, the wide FOV camera is displaying using the Night Underway contrast.

The Web control page provides a subset of the features of the JCU that let you control camera motion and viewing. System setup and menu-based functions must still be done with the JCU.

Controlling Camera Position

To control the camera movement, use the arrow button:

- Pressing the single arrow and releasing the mouse button in less than one second lets the camera move one step (1/3 or 1/4 of FOV).
- ▶ Pressing and holding the single arrow allows the camera to move at 1/10 FOV per second. Releasing the mouse button stops the movement.
- ▶▶ Pressing the double arrows produces the same results but at two times the speed (steps and speed).

You can also double-click the position symbol in the upper left portion of the GUI to make the camera turn in that direction. The camera symbol indicates the direction the Voyager III camera is pointing relative to the bow of the vessel.

While you can use the Home button to return the camera to its home position, you cannot change the home position through the GUI. When you click Home, the camera returns to the last saved position. Changes to the Home position must be made through the JCU.

Image Mode Control

Click the Color button to switch between red (night) and gray (daytime) color modes, as shown in the following graphic.

The possible color modes are configured on the System Setup Menu (see “Color Thermal Video” on page 50 for details). Use the Polarity button to switch between white-hot and black-hot:

White Hot. Hot objects are displayed in white, cold objects in black, with the color gradient between them indicating relative temperatures between hot and cold.

Black Hot. Reverses the image and hotter objects are displayed in black.

Contrast Mode

Contrast Mode lets you select from four preset scenes: Night Underway, Night Docking, Day, and Man Overboard. These are the same options that display when you use the SCENE button on the JCU (see page 17). Select the one that produces the best image for your needs for the current environmental conditions.

IR Video Controls

Using the IR video controls, you can switch between the wide and narrow field of vision cameras. When the narrow field of view camera is streaming, you can use the Near and Far buttons to manually focus the camera. Use the Far button to “pull back” on the focus function, and the Near button to focus in. Using the Near and Far buttons instead of autofocus will speed up the focusing process. Use the Auto button if you want the system to calibrate focus for you.

DLTV Controls

Using the DLTV controls, you can select the daylight camera as your video input stream. When Video is selected, use the other settings to move the camera view in and out and to adjust the field of vision.

Web Browser Configuration

The Voyager III webcam feature should be used with Microsoft Internet Explorer 8 or higher.

Browser Security Settings

In order to be able to download the required VLC Player or run it as an ActiveX control in your browser, you may need to change some IE security settings or respond to security warnings when prompted. If you require the higher security that prevents downloads, you can change the settings when the download completes.

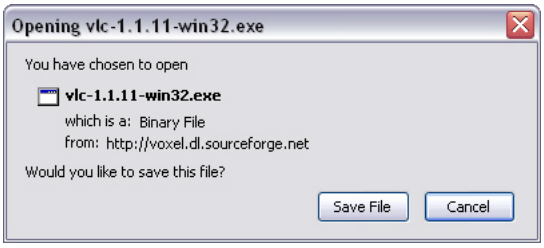
To change the security settings to allow the download of the player, use the menu option Tools in IE and select Internet Options. On the Options page, click the Security tab and ensure that the level is not set to High for the Internet zone.

Installing the VLC Player

Before you can start using the Voyager III webcam feature, you must download and install the VLC Video Player, which is the supported video player. You can download a copy of the player here:

http://www.videolan.org/vlc/download-windows.html

You have several choices of files to download. These instructions assume you have chosen the .exe version of the install package. You will be prompted to run or save the file.

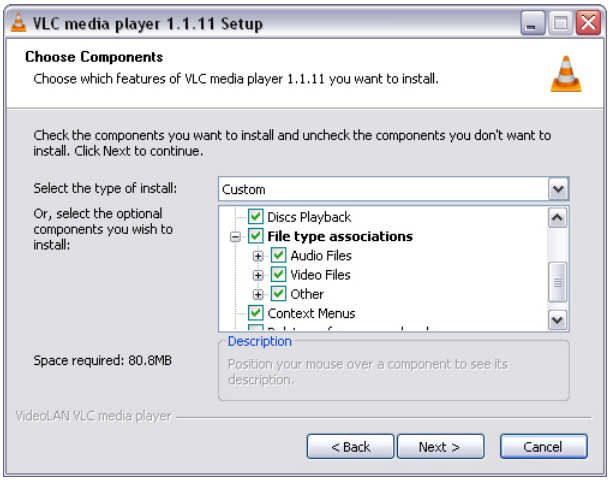


Click Save File and specify a location for the downloaded install package. When the download completes, open the folder and double-click the .exe file to run the install.

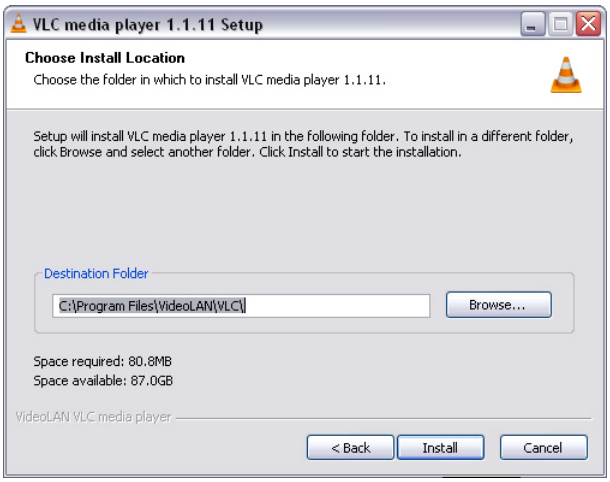
VLC media player 1.1.11 Setup
Welcome to the VLC media player 1.1.11 Setup Wizard
This wizard will guide you through the installation of VLC media player 1.1.11.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

When the install window displays, click Next to begin installation. Accept the terms of use and click Next.

You can accept the default components to install or review them to see if they are appropriate for your use. For example, you may only want to use VLC with video files so you can uncheck other file type associations.


VLC media player 1.1.11 Setup
Choose Components
Choose which features of VLC media player 1.1.11 you want to install.
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select the type of install:
Custom
Or, select the optional components you wish to install:
Discs Playback
File type associations
Audio Files
Video Files
Other
Context Menus
Description
Position your mouse over a component to see its description.
Space required: 80.8MB
VideoLAN VLC media player
< Back
Next >
Cancel

Click Next to continue. Choose a location for the installed files or accept the default.


VLC media player 1.1.11 Setup
Choose Install Location
Choose the folder in which to install VLC media player 1.1.11.
Setup will install VLC media player 1.1.11 in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.
Destination Folder
C:\Program Files\VideoLAN\VLC\
Browse...
Space required: 80.8MB
Space available: 87.0GB
VideoLAN VLC media player
< Back
Install
Cancel

Click Next to complete the installation and Finish when the file install is over.

If you have problems finding or downloading the player, contact FLIR Support.

Advanced Configuration Topics

Your installation may require more advanced features than simply connecting the PC to use the webcam interface. This section discusses some of these other configuration options:

- Changing the IP address of the camera
- Changing the IP address of the JCU
- Using the webcam from a remote computer
- Enabling Universal Plug and Play
- Streaming video to an external IP address

Setting up these features may require a significant amount of configuration of network equipment that is completely independent of the Voyager III camera. Configuring it correctly may require a level of familiarity with managing IP networks that is beyond the skill set of many people.

Make sure you know how to manage and configure the other equipment in the network (for example, the cable, DSL or wireless modem/router used to connect to the Internet). FLIR technical support can only provide limited support in this regard.

Changing Voyager III Camera Static IP Address

If the network makes use of Network Address Translation (NAT) and port forwarding and/or a firewall, the webcam feature requires that certain ports are opened up to allow access to the camera control and to allow for video streaming. In particular, the following ports are used by default.

Port	Protocol	Comment
TCP Port 80	HTTP	Web browser access
TCP Port 8080	HTTP	JCU
TCP Port 554	RTP	Video streaming
TCP Port 8082	HTTP	Webcam

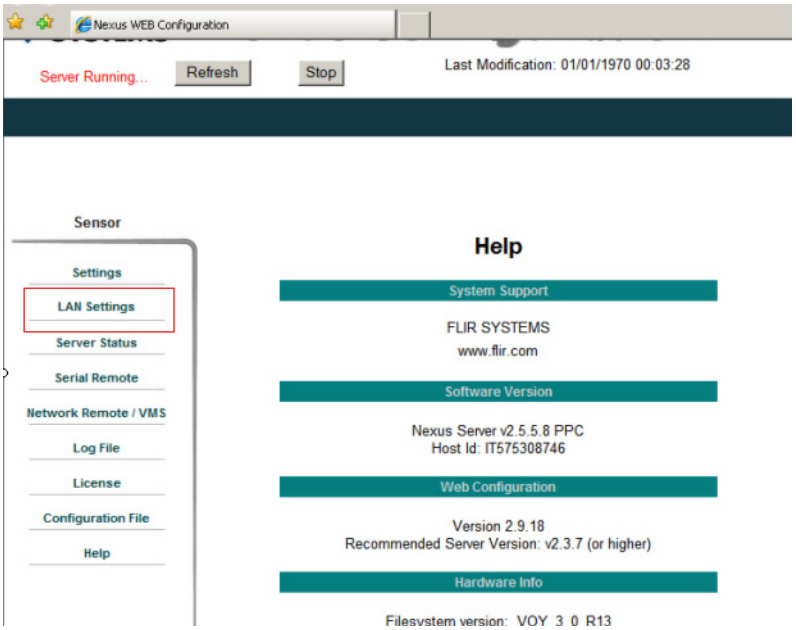
You may want to change the IP address for the Voyager III camera from the default value (192.168.250.116) to an address that is within the address space of the existing IP network on the vessel. For example, you may already have devices such as IP cameras, PCs, and routers attached to a local area network (LAN).

You modify the IP address for the camera using a Web browser. After the camera is powered on, point the browser on the PC to the camera default IP address by typing `192.168.250.116` in the address field.

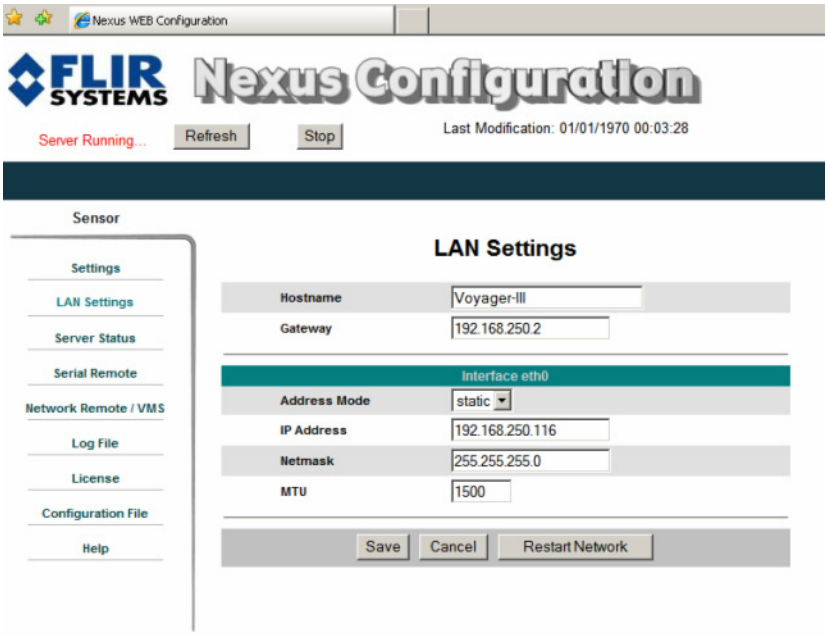
The Web browser will display a page with a login prompt and picture of the Voyager III camera.

When this screen appears, click the link to log in as the basic user. You can ignore the User and Password fields.

The Help screen displays. Click the LAN Settings tab on the left.



When the LAN Settings screen displays, enter the Hostname, Gateway, IP Address, and Netmask that are appropriate for the local network. Then click Save.



A message will appear indicating the IP address has been changed. At this point, the browser will no longer be able to communicate with the camera.

You can now change the network setting of the PC back to its original state of obtaining an IP address automatically from your local network.

Changing the IP Address of the JCU

The JCU communicates through the ethernet IP protocol just like the Voyager III camera does. Each JCU comes with a static IP address assigned. If you plan to use more than one JCU on your network, you may need to change the IP addresses of the additional JCUs to avoid IP conflict errors that would result if two devices had the same IP.

You do this using steps similar to the way you changed the camera IP address:

1. Point the browser on the PC to the JCU default IP address by typing the following in the address field:

   http://192.168.250.117/index.html

   The JCU control page displays, with a picture of the JCU.

2. For Network Addressing, select Static.
3. Enter the new value you want to use in the IP field. The Network Mask should fill in automatically (255.255.255.0).
4. Click Save to save your changes and exit the control page.

Enabling Universal Plug and Play (UPnP)

If you need to frequently access the camera or JCU through the IP interface, you can do this without having to type the IP address if your PC is configured to use Universal Plug and Play (UPnP). In this case, the network devices display automatically as icons and you can simply click on them to open the control page.

UPnP is typically not active on older computers using Windows XP but can be activated by following the steps outlined here.

Note: The JCU and camera will display on the PC network only when the PC is on the same network as the camera. If the PC is not configured with a static IP address, the UPnP icons will not display.

UPnP Overview

UPnP is a set of networking protocols that allows devices on a network to connect automatically, without the need for configuration by a network expert, thus simplifying the implementation of networks and the installation of computer components. A UPnP compatible device from any vendor can dynamically join a network, obtain an IP address, announce its name, convey its capabilities upon request, and learn about the presence and capabilities of other devices.

UPnP devices are plug-and-play in that when connected to a network they automatically announce information about themselves and supported device and services types, enabling clients that recognize those types to immediately begin using the device.

Voyager III cameras and JCUs are UPnP devices so they broadcast their presence on the network. A PC configured to accept UPnP broadcasts will show all UPnP devices discovered under My Network Places.

Enabling the UPnP User Interface

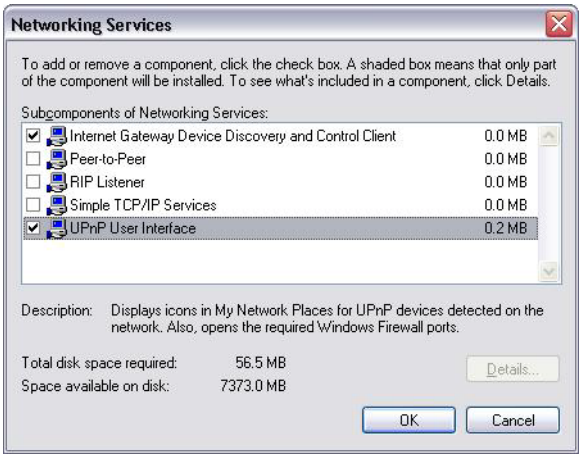
In some cases, Windows will discover UPnP devices and provide its own user interface to control them. Windows Vista and Windows 7 automatically detect network devices in the Network page. If UPnP devices are hidden, a prompt at the top of the screen will ask if you would like to display hidden devices.

With Windows XP, you can install the optional user interface (UI) component using the steps below. This UI component displays a balloon tip for newly discovered devices and places an icon for each device in the My Network Places folder. To enable the UPnP UI, follow these steps:

1. Click Start, click Control Panel, and then click Add or Remove Programs.
2. In the Add or Remove Programs dialog box, click Add/Remove Windows Components on the left side.
3. In the Windows Components Wizard, click Networking Services and then click Details.

Windows Components Wizard
Windows Components
You can add or remove components of Windows XP.
To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Components:
MSN Explorer 20.7 MB
Networking Services 0.3 MB
Other Network File and Print Services 0.0 MB
Outlook Express 0.0 MB
Update Root Certificates 0.0 MB
Description: Contains a variety of specialized, network-related services and protocols.
Total disk space required: 56.5 MB
Space available on disk: 7373.0 MB
Details...
< Back
Next >
Cancel

4. Select the Universal Plug and Play check box.


Networking Services
To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Subcomponents of Networking Services:
Internet Gateway Device Discovery and Control Client 0.0 MB
Peer-to-Peer 0.0 MB
RIP Listener 0.0 MB
Simple TCP/IP Services 0.0 MB
UPnP User Interface 0.2 MB
Description: Displays icons in My Network Places for UPnP devices detected on the network. Also, opens the required Windows Firewall ports.
Total disk space required: 56.5 MB
Space available on disk: 7373.0 MB
Details...
OK
Cancel

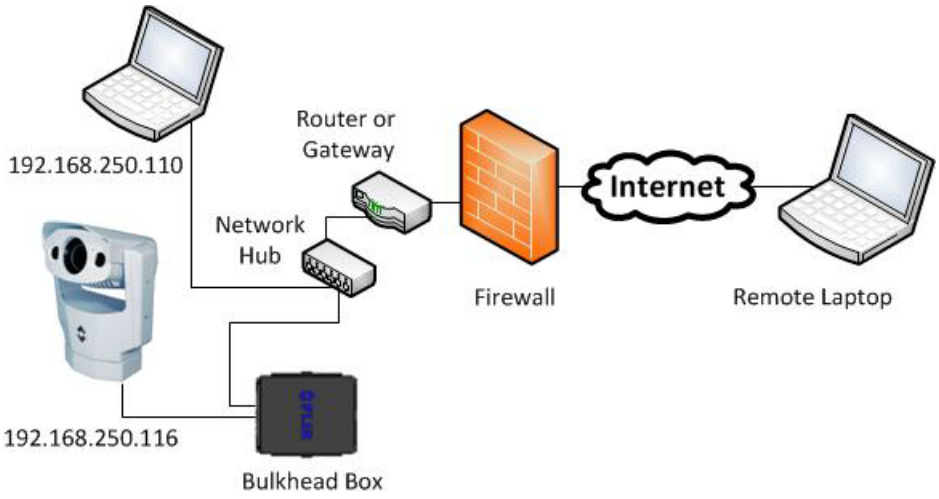
5. Click OK, and then click Next in the Windows Components Wizard. You may need to provide your Windows XP installation CD.

You can now see if any UPnP-enabled devices exist on your network by opening My Network Places. If there are UPnP devices on your local network, they will appear here with a generic icon based on the device type. In the future when a UPnP device is installed on the network, a notifying icon will appear briefly in the System Tray. When you see this icon, go to My Network Places to view the new device. Double-click on the icon to bring up its control page.

Using the Webcam Feature Remotely

The webcam feature is designed to let you access the camera remotely over the Internet. If you want to extend the webcam feature for use over the Internet, you need an Internet connection with a cellular or satellite router and firewall. Configuring this kind of network is outside the scope of this manual.

The following diagram shows a typical scenario where a laptop in a remote location is being used to connect to the Voyager III camera over the Internet. It is assumed the router/gateway will perform Network Address Translation (NAT) and port forwarding.



Warning: To protect against unauthorized access to your camera from other Internet users, you must take steps to protect your connection. FLIR recommends that you set up a firewall on your router.

Configuring the Camera to Output to a Remote Device

In some circumstances, you may have a need to send output from the camera to be viewed on a video display at a remote location. For example, you may hire a security firm to watch your boat and they may be located physically at some distance from the harbor. If this is required, you can configure the camera to output directly to a remote IP address.

Note: After you make this update, you cannot use the webcam feature unless you reverse the change.

To update the camera settings, you log into the Web configuration page with the browser the same way as shown for changing the IP address (see page 72). However, this time you must enter the administrative user ID and password as follows:

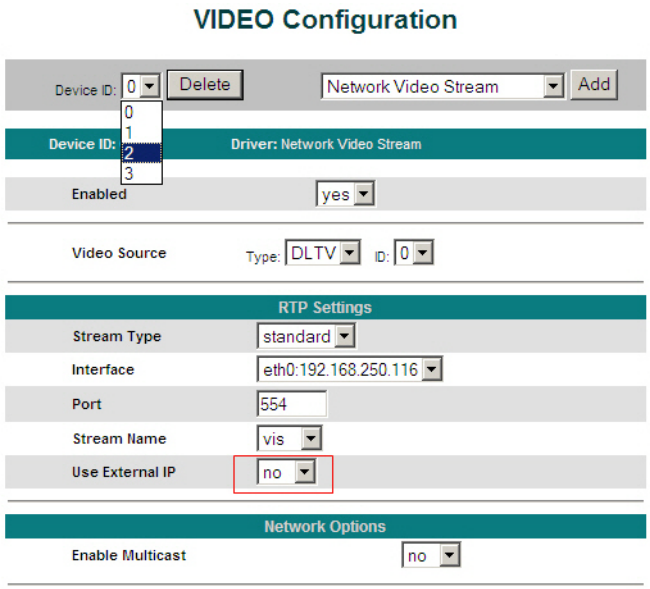
User: admin

Password: indigo

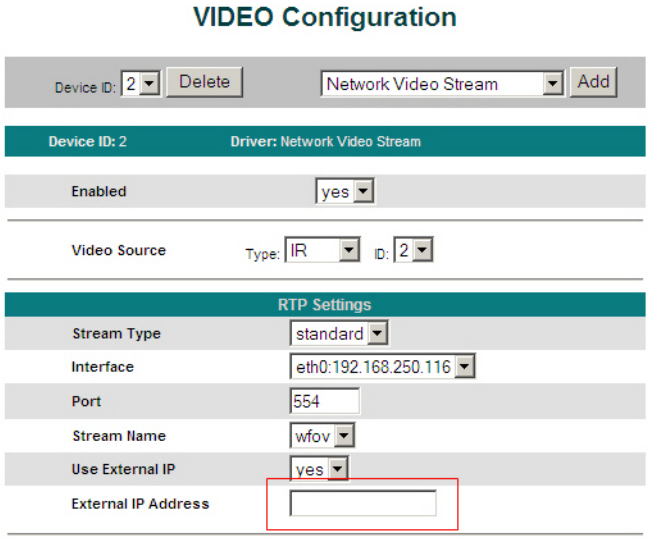
The General Setting screen displays. Click the Modules button on the top of the screen and the Video Configuration screen will appear. Since the camera has three imagers, you must configure three devices:

- Device ID 0 is associated with the daylight TV camera.
- Device ID 2 is associated with the Wide FOV thermal video (stream name wfov).
- Device ID 3 is associated with the Narrow FOV thermal video (stream name nfov).

Select Device ID 2 from the pull down. Then click the Use External IP pulldown and select yes.



When you select yes, a new External IP Address field appears on the page. Enter the static IP address that the router/gateway uses to access the Internet.



After you enter the external IP address, scroll down the page and click the Save button. Then repeat the same steps for the other two devices.

Caution: Remember to click Save before selecting another device or your changes will not be saved.

When you are done, stop and start the Web server by using the Stop/Start buttons at the top of the Web page. Restarting the camera has the same effect, but stopping and starting the server is quicker.

Note: Remember that when the camera is configured for access from the remote PC through the router/gateway, you can no longer access the webcam feature from the local PC.

Custom Network Applications

Programmers/Integrators

In more advanced/sophisticated installations where other devices such as radars are present on the network, the use of a PC allows more complicated configuration, flexibility and customization. This interface is primarily intended to give installers, dealers or even system integrators direct access to low-level configuration options and to the actual network commands as they are being processed.

For specialized applications, FLIR offers the Nexus Software Developers Kit (SDK) that lets a marine electronics integrator write custom software programs based on the Nexus communication protocol. The SDK is a tool that helps integrators deploy FLIR Voyager III thermal imaging cameras and other marine electronics such as radar in advanced networks. The SDK accelerates any application programming with FLIR thermal imaging cameras and lets integrators combine camera functionality with other sensors and detection devices to take full advantage of this advanced technology.

The SDK is available for download at no charge from the FLIR Network Systems Web site. The SDK helps software developers create SDK-based applications that make use of the rich features in the Nexus application. It provides a step-by-step guide for the creation of applications to control the pan/tilt motion of cameras, individual camera settings such as zoom and gain control, and many other powerful features that allow integration of Nexus-enabled cameras into on-board control systems.

You can find the SDK for download on the FLIR Developers Network tab:

http://ns.flir.com/

If you are a new user, you must register as a developer before you can download the SDK. Register and create an account on the FLIR Web site before downloading any files. You can purchase optional software support packages at the same location. Contact your FLIR dealer where you purchased the camera for additional information, or contact FLIR directly using the contact information printed on the back of this manual.

Resources Available

If you would like more information about thermal imaging cameras and about integrating FLIR products with other marine electronics, please visit our Web site or call to speak with an applications expert, using the contact information available on the back cover of this document.

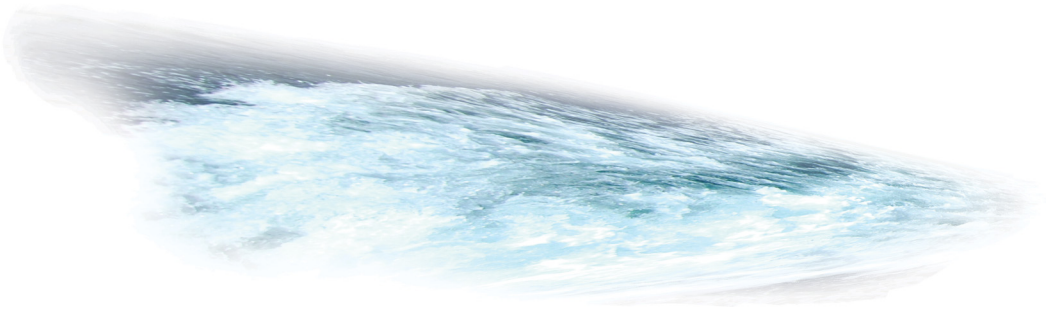
Training

If you are interested in learning more about thermal imaging cameras, FLIR offers complimentary training courses at the Infrared Training Center:

http://www.flir.com/training

CHAPTER 7

Voyager III Reference



Introduction

This chapter includes a glossary of acronyms, a list of symbols used in on-screen display, and a number of lists and tables that summarize system information.

It also includes a set of tips for troubleshooting issues you may encounter while using your camera system.

Acronyms

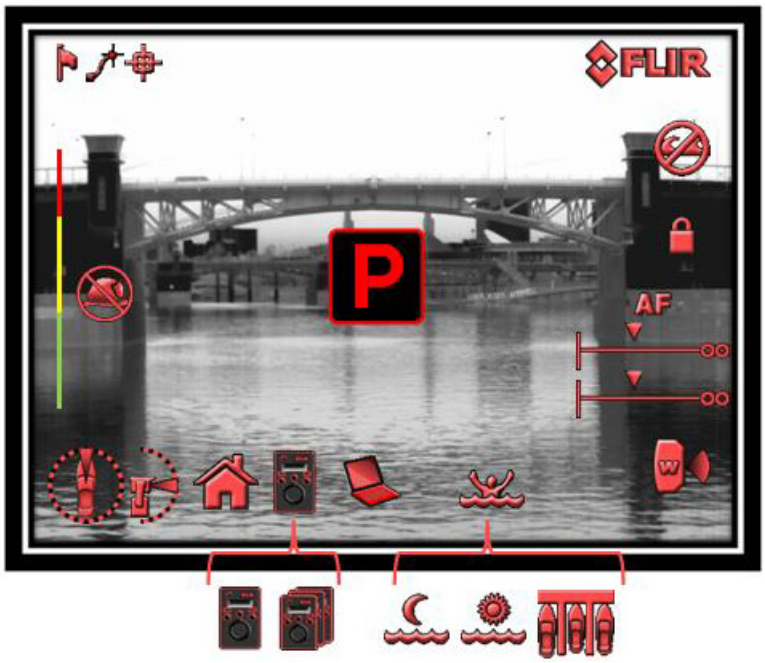
The following table lists each acronym that is used in this manual and its meaning.

Acronym/Term	Definition
AGC	Automatic Gain Control
ANSI	American National Standards Institute
API	Application Programming Interface
BWC	NMEA Bearing and Distance to Waypoint, Great Circle
CIDR	Classless Inter-Domain Routing
DHCP	Dynamic Host Configuration Protocol
EAR	Export Administration Regulations
EMI	Electromagnetic Interference
FFC	Flat Field Correction
FLIR	Forward Looking Infrared

Acronym/Term	Definition
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IR	Infrared
JCU	Joystick Control Unit
LCD	Liquid Crystal Display
LWIR	Long-wave infrared
MFD	Multifunction display
NAT	Network Access Translation
NMEA	National Marine Electronics Association
OSD	On-Screen Display
P/T	Pan/Tilt
PoE	Power Over Ethernet
RSD	NMEA Radar System Data
RTP	Real-time Transport Protocol
SCTE	Society of Cable Telecommunications Engineers
SDK	Software Developer's Kit
TTM	NMEA Target Tracking Message
VDC	Volts, Direct Current
VIS	Visible

List of Icons

Table 7.1 lists every icon that displays on the screen during various operations, with a brief description of its meaning. The following graphic illustrates the approximate location on the screen where each icon displays.



Some icons display permanently and some only display briefly. The display of some icons is affected by settings on the Set Symbology Menu (see page 52).

TABLE 7.1 List of Icons

Icon	Name	Description
AF	Autofocus	Displays when the autofocus function has been invoked from the narrow field of view thermal imager. A focus scale also displays
	No Autofocus	Indicates that the autofocus function cannot be used. Autofocus can only be used with the narrow field of view thermal imager.
	Focus Scale	Displays when autofocus is invoked to indicate the progress of the autofocus operation.
	Azimuth (Position)	Shows the azimuth (or direction) of the camera relative to the vessel. The shaded triangle shows the approximate camera field of view (FOV).
	Elevation (Tilt)	Shows the vertical tilt of the camera. The shaded triangle shows the approximate camera position.

TABLE 7.1 List of Icons

Icon	Name	Description
	No Firefighter	Displays when firefighter mode is enabled and the WFOV camera is not active. Indicates that you must switch to the WFOV to use firefighter mode.
	Home	Indicates the camera is in the Home position; the icon flashes when a new home position is set.
	Lock	Indicates that horizontal (pan) dimension of gyro stabilization is off because Point is enabled.
	Lock Off	Indicates that horizontal (pan) dimension of gyro stabilization is on because Point is disabled.
	JCU	Indicates a single JCU is currently connected to the camera unit.
	Multiple JCUs	Indicates more than one JCU is connected to the camera unit.
	Near Field of View	The near field of view thermal camera is active.
	Wide Field of View	The wide field of view thermal camera is active.
	NMEA BWS Message	Receiving NMEA messages using Bearing and Distance to Waypoint, Great Circle (BWC) sentence format has been enabled; this is also known as slew to waypoint.
	NMEA RSD Message	Receiving NMEA messages using the Radar System Data (RSD) sentence format has been enabled; this is also known as radar cursor tracking.
	NMEA TTM Message	Receiving NMEA messages using the NMEA Tracked Target Message (TTM) sentence format has been enabled; this is also known as radar tracking
	Park	The camera is currently in its parked position, looking forward and down (–90°). This position protects the camera from damage when it is not in use
	PC	Indicates a PC on the network has a connection with the camera. You can use the PC to perform basic camera controls and view the video output. See Chapter 6, "Voyager III Webcam Interface," on page 63 for details on integrating with a computer.

TABLE 7.1 List of Icons

Icon	Name	Description
	Scene: Night Running	One of four preset automatic gain control settings optimized for use on the open water at night.
	Scene: Night Docking	One of four preset automatic gain control settings optimized for use when the boat is docked at night.
	Scene: Day Running	One of four preset automatic gain control settings optimized for use on the open water during the day.
	Scene: Man Overboard	One of four preset automatic gain control settings optimized for providing visibility to small moving objects.
	Stabilization Off	The Gyro Stabilization setting, which protects the camera from the mechanical motion of waves, has been disabled using the menu. This icon remains on the screen.
	Stabilization On	The Gyro Stabilization setting, which protects the camera from the mechanical motion of waves, has been enabled using the menu. This icon flashes momentarily on the screen.
	Zoom Scale	Displays when zoom is invoked to indicate the progress of the zoom operation.

System Specifications

This section includes tables that list the component parts in your system, optional accessories, and details about physical characteristics, power usage, and environmental features of your Voyager III camera.

Parts and Accessories

The Voyager III system includes the thermal imaging components listed in Table 7.2. If the components you have are different from those listed here, please contact FLIR immediately using the contact information printed on the back of this guide.

TABLE 7.2 Voyager III Components

Component	Description	Part Number
Camera Body	7.3” x 4.0” x 8.0”	432-0005-01-00 432-0005-01-00S 432-0005-02-00 432-0005-02-00S
Bulkhead Box	6lb	500-0483-00
Joystick Control Unit (JCU)		500-0385-00
Camera Cable	50’ 100’ 150’ 200’ 225’	308-0201-50 308-0201-100 308-0201-150 308-0201-200 308-0201-225
JCU Cable	25’	308-0163-25
Operator’s Manual	Provided on CD or printed	432-0005-00-10
Quick Start Guide	Provided on CD or printed	432-0005-00-11
Installation Guide	Provided on CD or printed	432-0005-00-12

Table 7.3 lists the optional accessories you can purchase for your Voyager III system.

TABLE 7.3 Voyager III Accessories

Accessories	Description	Part Number
Deluxe Dual Station Accessory Kit	Includes the following parts: • Joystick Control Unit – Maritime • Cover, JCU, Marine • Ethernet cable, shielded, RJ45, 50’ • Video Amplifier, 12 VDC • 2 ea Injector – DC/DC PoE • 25’ video cable • 50’ video cable	500-0393-00 500-0385-00 4113315 308-0163-50 4108996 4113746 308-0164-25 308-0164-50
Standard Dual Station Accessory Kit	Includes the following parts: • Joystick Control Unit – Maritime • Cover, JCU, Marine • Ethernet cable, shielded, RJ45, 50’ • 2 ea Injector – DC/DC PoE	500-0394-00 500-0385-00 4113315 308-0163-50 4113746
Joystick Control Unit	Includes the following parts: • Joystick Control Unit – Maritime • Cover, JCU, Marine	500-0395-00 500-0385-00 4113315

TABLE 7.3 Voyager III Accessories

Accessories	Description	Part Number
Ethernet Cable	Double Shielded, RJ45, LSZH, 25’ Double Shielded, RJ45, LSZH, 50’ Double Shielded, RJ45, LSZH, 75’ Double Shielded, RJ45, LSZH, 100’	308-0163-25 308-0163-50 308-0163-75 308-0163-100
Video Cable	BNC Terminated, 25’ BNC Terminated, 50’ BNC Terminated, 75’ BNC Terminated, 100’	308-0164-25 308-0164-50 308-0164-75 308-0164-100
Power Accessory	Injector – DC/DC PoE	4113746

System Overview

Table 7.4 lists general characteristics of your Voyager III system.

TABLE 7.4 Voyager III Overview

Attribute	Value
General	
Size	15” x 23”
Weight	45 lb.
Azimuth Field-of-Regard	360° Continuous
Elevation Field-of-Regard	+/-90°
Slew Rate	Variable to 120°/sec.
Thermal Imaging Performance	
Sensor Type	2 Microbolometer Cameras
Wide FOV Imager	20° x 15° (35mm)
Narrow FOV Imager	5° x 3.75° (140mm)
Spectral Range	7.5 to 13.5 m
Daylight Imaging Performance	
Sensor Type	1/4” Super HAD
Wide FOV Limit	42° horiz. @ F1.6
Narrow FOV Limit	1.6° horiz. @ F3.8
System Specifications	
Pan/Tilt Coverage	360° Az./ +/-90° El.
Video output	NTSC or PAL
Power Requirements	24VDC

TABLE 7.4 Voyager III Overview

Attribute	Value
Environmental	
Operating Temp. Range	-28°C to 55°C
Non-Operating Temp. Range	-50°C to 85°C
Vibration	Per MIL-STD-810

Troubleshooting Tips

This section includes information that may help you with common issues that may arise during operation of the Voyager III system.

Video not displayed on monitor

The camera will not display video if it is in standby mode. Power cycle the camera and allow the system to complete boot cycle prior to JCU connection. Ensure the JCU is assigned to the camera, the camera ID appears in the JCU display, and the camera responds to JCU input (for example, pan/tilt movements).

If the camera will not produce an image, check the video connection at the camera and at your display. If the connectors appear to be properly connected but the camera still does not produce an image, ensure that power has been properly applied to the camera and circuit breaker is set properly. If a fuse was used, be sure the fuse is not blown.

Check the wiring at both the electrical panel and at the termination to the JCU. Ensure that the contacts are clean, dry and free from corrosion. If maintenance on the wiring connection is required, have an authorized service representative make the appropriate repairs.

If the camera still does not produce an image, contact the FLIR dealer or reseller who provided the camera, or contact FLIR directly (contact information is provided on the rear cover of this manual).

Cleaning

If the camera lens has become smudged or dirty, clean it with low-pressure fresh water and a soft cloth. Improper care of the camera window can cause damage to its anti-reflective coating, degrade the camera's performance, and void the camera warranty.

The camera housing has a durable marine coating. Rinse the camera housing with very low-pressure fresh water to keep it clean. If the front window of the camera gets water spots, wipe it with a clean lens cloth folded in fourths and dampened with fresh water.

To clean the JCU, use a soft cloth and clean water. Mild household cleaner such as Windex can also be used to remove tougher stains or spots.

Caution: Do not use alcohol based cleaners or any type of solvents as this may discolor or damage the unit.

Video not switching between thermal and visible

The display can be switched between the thermal camera and the visible camera by pressing and holding the SCENE button. If this does not cause the display to switch from the thermal camera to the visible-light camera, be sure the proper input channel is selected on the display.

Noisy image

A noisy image is usually attributed to a cable problem—too long or inferior quality—or the cable is picking up electromagnetic interference (EMI) from another device. Although coax cable has built-in losses, the longer the cable is or the smaller the wire gauge/thickness, the more severe the losses become; and the higher the signal frequency, the more pronounced the losses. Unfortunately this is one of the most common and unnecessary problems that plagues video systems in general.

Cable characteristics are determined by a number of factors such as core material, dielectric material and shield construction, among others and must be carefully matched to the specific application. Moreover, the transmission characteristics of the cable will be influenced by the physical environment through which the cable is run and the method of installation. Use only high quality cable and ensure the cable is suitable to the marine environment.

Check cable connector terminations. Inferior quality connections may use multiple adapters that can cause unacceptable noise.

Image too dark or too light

By default, the Voyager III thermal camera uses an Automatic Gain Control (AGC) setting that has proven to be superior for most applications. However, a specific environment may benefit from a different AGC setting. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate. You should keep the ocean, and not the sky or the boat, as the predominant object in the image. Refer to “SCENE Button” on page 17 for information about how to make adjustments to the image.

Performance varies with time of day

You may observe differences in the way the camera performs at different times of the day, due to the diurnal cycle of the sun. Recall that the camera produces an image based on temperature differences.

At certain times of the day, such as just before dawn, the objects in the image scene may all be roughly the same temperature, compared to other times of the day. Compare this to imagery right after sunset, when objects in the image may

be radiating heat energy that has been absorbed during the day due to solar loading. Greater temperature differences in the scene generally will allow the camera to produce high-contrast imagery.

Performance may also be affected when objects in the scene are wet rather than dry, such as on a foggy day or in the early morning when everything may be coated with dew. Under these conditions, it may be difficult for the camera to show the temperature the object itself, rather than of the water coating.

Eastern or Western exposure

While a boat is under way, the camera may inevitably end up pointing directly east or west, and this may cause the sun to be in the field of view during certain portions of the day. We do not recommend intentionally viewing the sun, but looking at the sun will not permanently damage the sensor. In fact the thermal imaging camera often provides a considerable advantage over a conventional camera in this type of back-lit situation.

However, the sun may introduce image artifacts that will eventually correct out and it may take some time for the camera to recover. The amount of time needed for recovery will depend on how long the camera was exposed to the sun. The longer the exposure, the longer the recovery time needed.

Multiple Cameras and/or JCUs on a single network

You can configure your system with multiple cameras and multiple JCUs on the same network. More than one JCU can be used to control a given camera. The camera will respond to commands from both JCU's in the order the commands are received across the network. Unpredictable behavior may result from users sending conflicting commands from separate JCU's (for example, one user pans left and the other user pans right). In general, the camera will respond to the last command received and there is no way to set priority, given that IP networks use a “best effort” delivery protocol.

NOTES

FLIR Systems, Inc.

CS World Headquarters
FLIR Systems, Inc.
70 Castilian Dr.
Goleta, CA 93117
USA
PH:+ 1 805 964 9797
PH:+ 1 877 773 3547 (Sales)
PH:+ 1 888 747 3547 (Apps)
FX: + 1 805 685 2711
sales@flir.com

EUROPE
CS Eurasian Headquarters
FLIR Systems CVS BV
Charles Petitweg 21
4847 NW Teteringen - Breda
Netherlands
PH: + 31 (0) 765 79 41 94
FX: + 31 (0) 765 79 41 99
flir@flir.com

FLIR Systems, Inc.
Corporate Headquarters
FLIR Systems, Inc.
27700A SW Parkway Ave.
Wilsonville, OR 97070
USA
PH: + 1 503 498 3547
PH: + 1 877 773 3547
FX: + 1 503 498 3153
sales@flir.com